Industry & WELDING

APRIL / 1959

WELDING MANAGEMENT • PRODUCTION • ENGINEERING

STEVENS RICE
UNIVERSITY MICROFILMS
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WIR

IS YOUR PLANT COST CONSCIOUS?

18 cost cutting ideas you can use ... page 55

ALSO IN THIS ISSUE: Complete coverage of the American Welding Society 40th Annual Convention and Welding Show, April 6-10.

THE MAGAZINE OF WELDED FABRICATION

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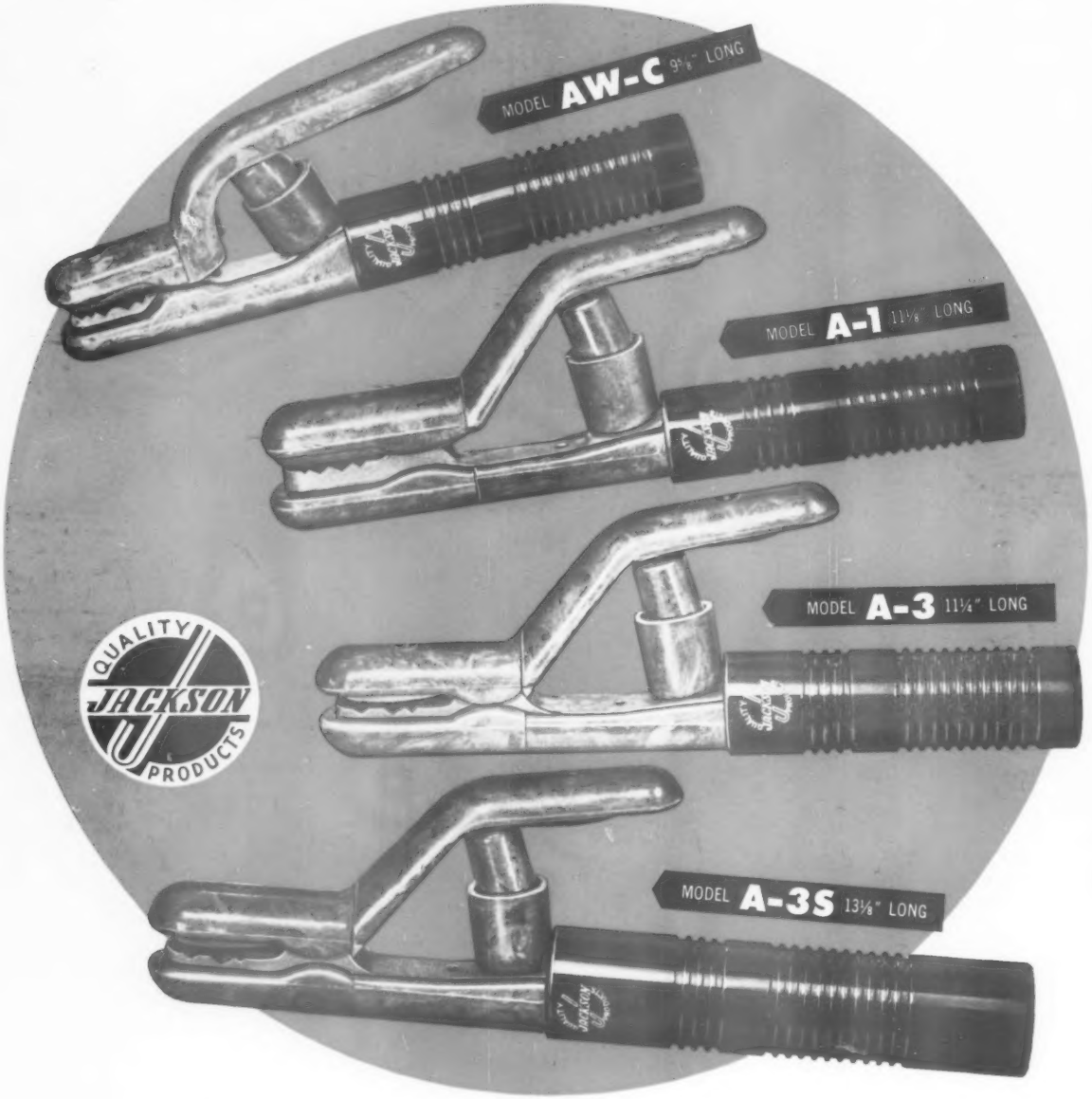

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For top production, select the holder best suited to the job at hand. The table at the right rates these holders by duty cycle, that is the percentage of arc time in any ten-minute period of work, depending on rod size, amperage and cable size.

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Medium	A-1	1/4"	300-1/0 350-2/0	50%
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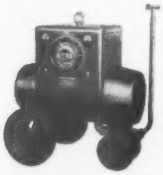
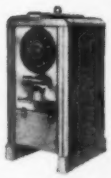
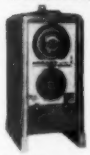


DC ELECTRIC DRIVE WELDERS for production and shop welding.



DC RECTIFIER for shop type welding, production, maintenance.

"CONTRACTOR'S SPECIAL" 250 amp. gas drive model.



AC/DC TRANSFORMER-RECTIFIER combination for both AC and DC welding.

300 AMP. GAS DRIVE for general purpose welding.

MODEL GO-2245-P aircooled combination welder and power unit

HOBART ac POWER dc WELD

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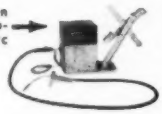

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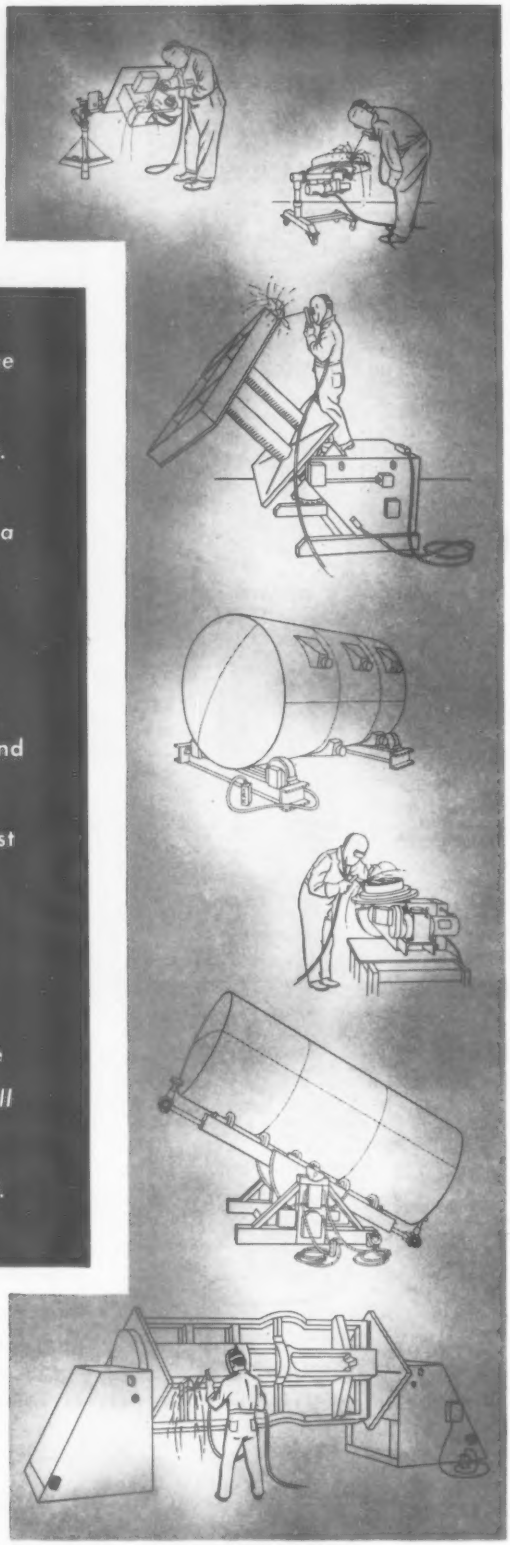

In a board walk the largest item of expense is the lumber; in a splendid violin the least item of expense is the lumber.

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This principle, in a certain degree, applies to the making of a good positioner. We do not pretend that we put more or less material into each Aronson Positioner; but we do put in the best materials, the scientific knowledge and expert skill and the long-continued care which no ordinary positioner contains.

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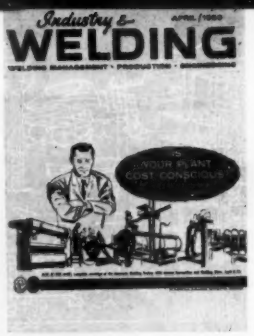
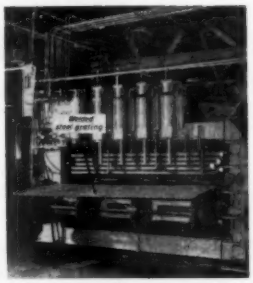


COVER

cost conscious welding management looks for equipment that will do the job better and faster

READERS' GUIDE

April, 1959 volume 32 number 4



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35 WELDING DISTORTION: CAUSES AND CURES
An expert tells how to control distortion and shrinkage in welded fabrication and how to make it work to advantage.

37 700 KVA MACHINE FABRICATES 10-TONS OF GRATING IN 8 HOURS
Accurate automatic loading, precision notching and forming, and automatic resistance welding give high production.

38 ULTRASONIC WELDING: THEORY AND PRACTICE
Aluminum, platinum, moly and other metals can be welded ultrasonically without alloying of base metal microstructures.

40 AUTOMATIC EQUIPMENT SPEEDS WELDING
When Ryan switched to automatic welding, rejects dropped from 84 percent to under one; welding time was cut 90 percent.

45 IS LAMINATED STEEL YOUR PROBLEM?
Here's how Caterpillar uses ultrasonic testing to prevent laminated steel plate from turning up in near finished weldments.

46 HIGHWAY RAILS ARE DESIGNED FOR WELDING
Proper welded design and good fabricating and welding techniques combine to make a low cost, high quality product.

48 SKIP BURNING CONTROLS DISTORTION
Larger filter pipe is slotted in job-shop operation by controlled flame cutting. Distortion is practically eliminated.

51 FASTER HARD FACING WITH SEMIAUTOMATICS
Semiautomatic open arc hard facing cuts labor costs in half and salvages an $8000 shovel bucket.

52 WELDED DESIGN SPEEDS HEAVY FABRICATION
Pattern storage and maintenance are no problem since Morgan switched to stronger and more versatile welding on slab pushers.

55 18 COST CUTTING IDEAS FOR 1959
Big savings and improved products have resulted from teamwork between equipment manufacturers and welding management and engineers.

66 RESISTANCE WELDING OF VINYL COATED STEEL
Welding time, energy and pressure must be controlled to make a weld without damaging the vinyl.

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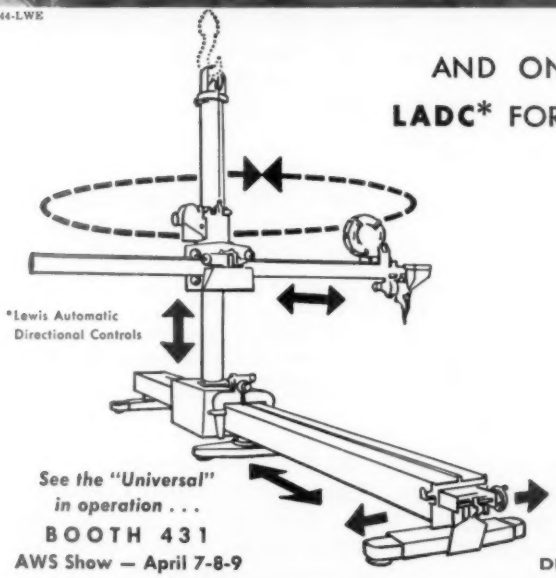

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BOOTH 431
AWS Show — April 7-8-9

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AWS Annual Convention And Welding Show

CHICAGO, ILLINOIS: The 40th Annual Convention and Welding Show of the American Welding Society to be held here April 6 to 10 will highlight National Welded Products Month. April was so designated by presidential proclamation and will be declared each year to coincide with the AWS annual Convention and Welding Show.

Thousands of the world's foremost welding experts, metallurgists, manufacturers and fabricators who attend the AWS Convention and Welding Show will see emblems similar to the one above on plaques in exhibit booths and on cloth banners in the convention hall.

Throughout the nation during the month, 81 AWS Sections will dramatize the importance of welding to the economy of the national and to the American way of life. Local plans include: proclamations by governors and mayors, cooperation by local industries, plant tours, department store promotions and civic functions.

The Welding Show opens at noon, Tuesday, April 7, in the International Amphitheatre and runs through Thursday, April 9. At press time, more than 95 percent of the display area had been assigned. According to Fred L. Plummer, national secretary of the Society, "It is going to be the biggest show in our history."

The show hours are as follows: *Tuesday, April 7*: Noon to 10pm; *Wednesday, April 8*: 10am to 10pm and *Thursday, April 9*: 10am to 6pm.

Technical sessions sponsored by the American Welding Society and the American Institute of Electrical Engineers will be held at the Hotel Sherman. The five-day program is one of the most comprehensive ever attempted, according to T. N. Armstrong, chairman of the Papers Committee. He reports "The quality of the papers has never been higher."

The technical program is as follows:

Monday afternoon, April 6: Nuclear Power Equipment, Stainless Steels, Processes and Procedures.

Tuesday morning, April 7: Arc Welding Power Supplies, Nuclear Power Equipment,

A

Booth
- 701 Acetogen Gas Company
- 521 Air Reduction Sales Co., Division of Air Reduction Co., Inc.
- 530 Alloy Rods Company
- 610 All-State Welding Alloys Company, Inc.
- 421 Aluminum Company of America
- 625 Amalgamated Industrial Corp.
- 412 American Manganese Steel Division, American Brake Shoe Company
- 336 American Messer Company
- 322 American Platinum & Silver Division, Engelhard Industries, Inc.
- 200 American Pullmax Co., Inc.
- 904 Ampco Metal, Inc.
- 906 Arcair Company
- 523 Arcos Corporation
- 221 Aronson Machine Company
- 525 Aro Spot Welder Division, Guthery Machine Tool Corp.

B

- 226 Balteau Electric Corp.
- 309 Banner Welder, Inc.
- 723 The Berkeley Company

Booth
- 600 Bernard Welding Equipment Co.
- 700 Brennan, Bucci & Weber, Inc.
- 315 The Budd Company, Electronic Controls Section

C

- 408 Cambridge Corporation, Division of Carrier Corp.
- 217 Cam-Lok Division, Empire Products, Inc.
- 436 Cayuga Machine & Fabricating Co., Inc.
- 910 Champion Rivet Company
- 234 Contour Marker Corp.
- 912 Coyne Cylinder Company

D

- 908 Dockson Corporation

E

- 121 Emerson Electric Mfg. Co.
- 500 Eutectic Welding Alloys Corporation
- 715 Exomet, Incorporated

F

- 326 Fenway Machine Co.
- 504 F & N Metal Products, Inc.
- 434 Fibre-Metal Products Co.
- 805 Frommelt Industries

G

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H

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- 425 Harnischfeger Corporation
- 120 Harris Calorific Company
- 601 Hobart Brothers Company
- 633 Robt. W. Hoffman Co., Inc.
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- 320 K S M Products, Inc.
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- 803 Kedman Company
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Highlights National Welded Products Month

Cutting. *Afternoon:* Arc Welding Fundamentals, Heat Effects on Steel Weldments, Pipe Lines.

Wednesday morning, April 8: Resistance Welding, Brittle Fracture, Design Considerations. *Afternoon:* Welding in Ship Structures, Resistance and Ultrasonic Welding, Titanium and Zirconium.

Thursday morning, April 9: Welded Structures, Weldability of Steel and Cast Iron, Aluminum Alloys.

Friday morning, April 10: Welded Structures, Gas-Shielded Welding, Brazing.

Highlights of the week's activities include the Adams Lecture on "The Science of Arc Welding" by Clarence E. Jackson, Linde Development Laboratory on Monday morning, April 6 and a two-part Educational Lecture on "Welding for High Temperature Aircraft Service" by P. Gordon Parks, Solar Aircraft Co. on Monday and Tuesday afternoons.

Plant tours have been set up for Wednesday, April 8. Arrangements have been made for a visit to the Superheater Division of Combustion Engineering, Inc., in combination with a tour of Champion Rivet Company's electrode plant.

On Thursday, April 9, a tour will be made of the Dresden Nuclear Power Station on a 950-acre site in Grundy County, Illinois. Many types of welding were used to fabricate this station for the Commonwealth Edison Company. The containment vessel alone is 190-feet in diameter and required over 17,000-feet of welding.

The Society's annual Ladies' Program will feature a "Get acquainted" social on Sunday evening April 5. Each morning a continental breakfast will be served. Many activities have been planned, including a visit to Chicago's Chinatown and a travelog by Mrs. F. L. Plummer of her travels in Europe last year.

turn to page 98 for more news of the welding industry

L

Booth
- 903 Lenco, Incorporated
- 431 Lewis Welding & Engineering Corporation
- 411 Lincoln Electric Company
- 300-305 Linde Company, Division of Union Carbide Corp.
- 621 Liquid Carbonic Division General Dynamics Corp.

M

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- 103 Magnaflux Corporation
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- 317 Metal Removal Company
- 614 Metal & Thermit Corp.
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- 730 National Cylinder Gas Division of Chemetron Corp.
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- 211 Nelson Stud Welding, Division of Gregory Industries

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- 216 Oxo Equipment Co.

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- 533 Page Steel & Wire Division, American Chain & Cable Co., Inc.
- 400 Pandjiris Weldment Company
- 920 Cecil C. Peck Company
- 605 C. E. Phillips & Co.
- 208 Philips Electronics, Inc.
- 233 Picker X-ray Corporation
- 807 Precision Welder & Flexopress Corporation
- 511 Pure Carbonic Company, Division of Air Reduction Co., Inc.

R

- 911 J. M. Ragle Industries
- 507 Reid Avery Company
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- 712 Smith Welding Equipment Corp.
- 232 Square D Company
- 130 Steffan Manufacturing Corp.
- 316 Stoody Company
- 907 Sylvania Electric Products, Incorporated

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- 512 Taylor-Winfield Corp.
- 220 Tec Torch Company, Inc.
- 613 Tempil Corporation
- 622 Tweco Products, Inc.

U

- 634 Uniflex Cable Division
- 604 Unique Equipment, Inc.
- 526 United Wire & Supply Co.

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- 325 Vacuum Tube Products Co.
- 620 Victor Equipment Company

W

- 917 Webb Corporation
- 903-A Welding Alloys Mfg. Co.
- 333 Martin Wells, Inc.
- 721 Weltronic Company
- 100 Westinghouse Electric Corporation
- 235 Worthington Corporation

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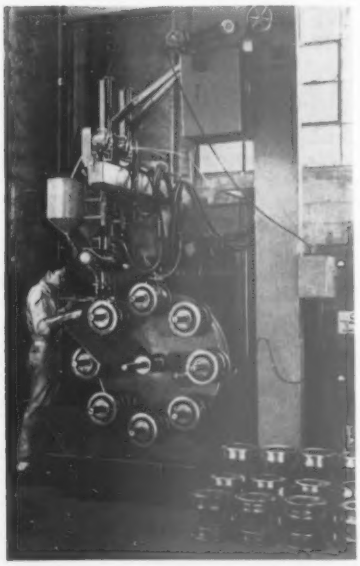

(Pictured Above) A complete *Rexarc* installation at Michigan Tractor & Machinery Co., Detroit, Michigan.

Here is the new *Rexarc* MS-8 Automatic Twin Head Roller and Idler Welder and Positioner that mounts 8 rollers at a time. Hydraulic indexing enables virtually a continuous automatic welding operation. Twin heads build up both sides of roller simultaneously.

•

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NEW—AC and AC/DC MSM Busybees—transformer type—for farm, ranch, garage, shop and general low-cost utility welding. Available in 180 Ampere Model.

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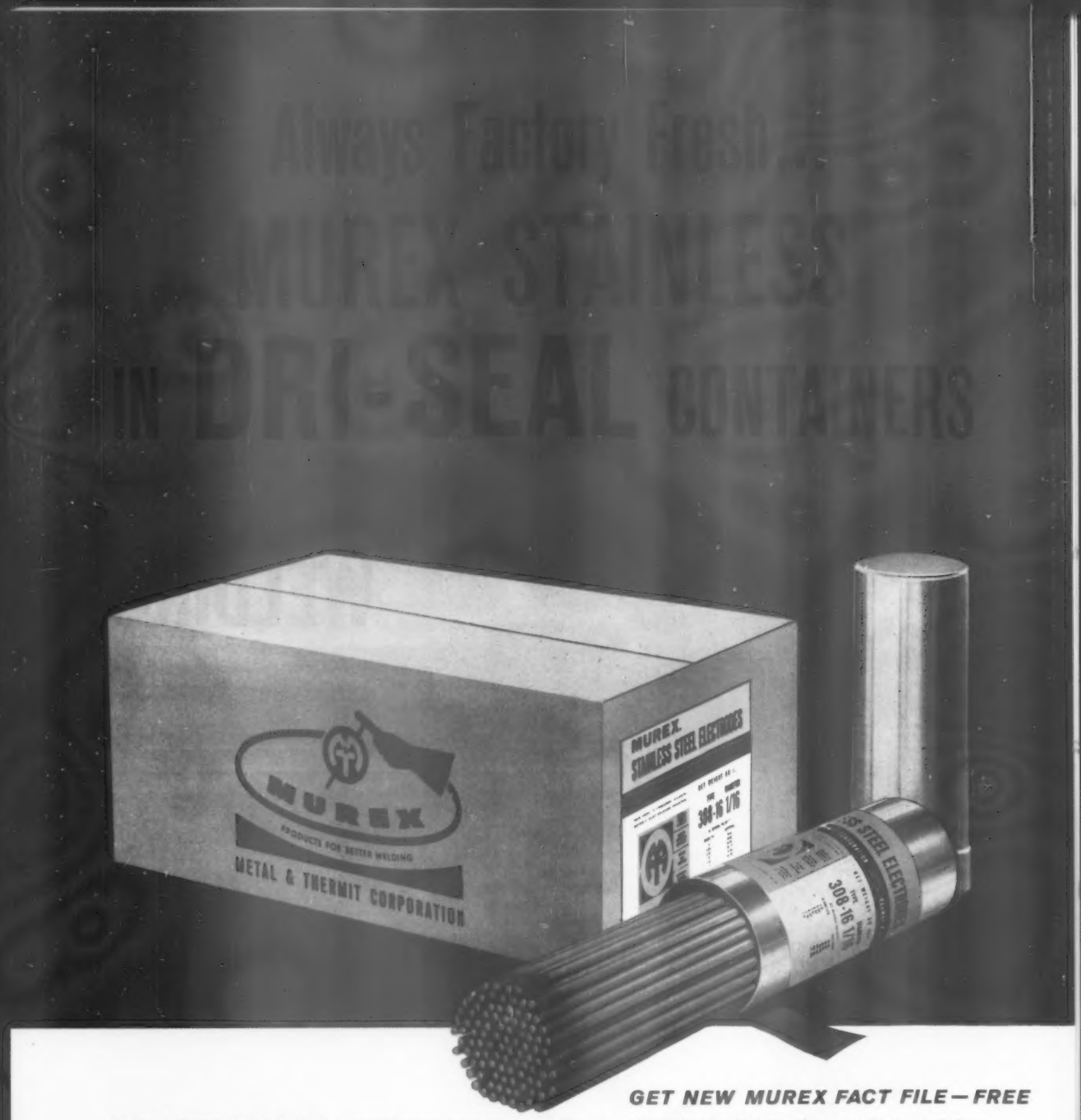
AT THE FRONTIERS OF PROGRESS YOU'LL FIND AN AIR REDUCTION PRODUCT • Products of the divisions of Air Reduction Company, Incorporated, include: **AIRCO** – Industrial gases, welding and cutting equipment • **AIRCO CHEMICAL** – vinyl acetate monomer, vinyl stearate, methyl butynol, methyl pentynol, and other acetylenic chemicals • **PURECO**–carbon dioxide–gaseous, welding grade CO_2, liquid, solid ("DRY-ICE") • **OHIO**–medical gases and hospital equipment • **NATIONAL CARBIDE**–pipeline acetylene and calcium carbide • **COLTON**–polyvinyl acetate, alcohols, and other synthetic resins.

For More Information Circle No. 3 on Reader Service Card.



New Murex DRI-SEAL containers guarantee you factory fresh Murex Stainless Electrodes when you first open the package... everytime you use them thereafter.

These extruded aluminum containers are hermetically sealed with a tough, easily removed plastic tape. Open the container, remove the electrodes you need and reseal the container... using the original tape. Complete protection of the unused electrodes is assured.

Murex Stainless Electrodes in reusable DRI-SEAL cans are available for practically every stainless welding application.

GET NEW MUREX FACT FILE—FREE

A revised edition of up-to-date stainless welding facts has just been printed on 3 x 5 cards for easy reference. Send for your complimentary set today.

MUREX
PRODUCTS FOR BETTER WELDING

METAL & THERMIT
CORPORATION
RAHWAY, NEW JERSEY
PARTNER IN WELDING PROGRESS SINCE 1904

A Deep Deep Cup for Extra Side Protection ... 8 Big Indirect Ventilation Ports for Comfort!

This light, comfortable, flexible mask goggle is American Optical's latest for welders. The large face mask and deeper cup not only provide greater protection than ever but easily fit over prescription glasses. Lens adapter is black, flame-resistant nylon. Takes our standard lens ring and regular 50 mm. round filter lenses and cover lenses. Rings and lens adapter are quickly replaceable. Noviweld filter lenses, shades 3, 4, 5, 6 protect against dangerous rays, glare, sparks and scale. Companion Chippers' Goggle is No. 489A.

It Has Protected Tens of Thousands of Eyes!

Over the years, this favorite has protected the vision of many a welder from the hazards of light rays, sparks and metal splashes. Side shields are engineered for ample (indirect) ventilation while fogging is controlled. Individual eyecups shaped to fit each eye are low set for wide vision. They won't conduct heat. Insulated ball-chain bridge is quickly adjusted. One-piece rubber headband. 50 mm. Noviweld or Filterweld lenses, shades 3, 4, 5, 6 or 8. Or Noviweld-Didymium lenses, shades 3, 4, 5, 6 for absorbing yellow sodium flare.

NOTE: Keep 'em clear with SUPER-CLEAR! AO 350 AF Super-Clear Lens Cleaner and Anti-Fog Fluid keeps glass and plastic clean and fog-free longer. Just spray it on and wipe it off. Test it and you will accept no substitute.

YOUR NEAREST AO SAFETY PRODUCTS REPRESENTATIVE CAN SUPPLY YOU

American Optical COMPANY
SAFETY PRODUCTS DIVISION

Always insist on Trademarked Safety Products

SOUTHBRIDGE, MASSACHUSETTS *Safety Service Centers in Principal Cities*

For More Information Circle No. 6 on Reader Service Card.

←**Circle No. 70 on Reader Service Card.**

ELECTRIC-ARC INC.

One of a Series on Applications of Electric Arc's Smith-Dolan Units — Today's Most Versatile Heat-Treating Tools.

STOP WELD FAILURE *with the* SMITH-DOLAN SYSTEM *of Low-Frequency Induction Heating*

Here is the versatile heat-treating tool you need for producing sound welds easily and economically in carbo-alloy and other types of steel pipe . . . here is precision control of heating cycle when pre-heating and stress relieving — uniform, through-and-through heating of solid sections up to two feet thick and more — pushbutton operation — complete portability for on-the-job heat treating anywhere.

Many Money-Saving Applications — The Smith-Dolan System simplifies and upgrades work quality in numerous applications ranging from welding to forming and annealing. Units are available for 60 cycle heating in capacities ranging from 10 to 150 KVA . . . for 400 cycle heating . . . resistance heating. Pre-engineered with complete instrumentation, accessories.

"On Trial" Installations on Rental Basis — Prove the many Smith-Dolan advantages in your own plant without capital investment. Write, wire or phone.

Electronic recording gives permanent charts of heat run on this standard Smith-Dolan model. Coils permit work at 50 feet or more from unit. Eye hooks provide for easy handling by crane. Products ranging from a fraction of an inch to 10 feet in diameter can be heat treated on the job.

New Brochure — Send today for your copy of "Smith-Dolan System of Low-Frequency Induction Heating."

Electric Arc, inc.

152-2 JELLIFF AVENUE, NEWARK 8, N. J. Bigelow 3-3211

Representatives in Principal Cities

For More Information Circle No. 30 on Reader Service Card.

MEN ON THE MOV

Falk

Holcin

Outcalt

Pollard

PROMOTIONS:

Tage Falk, formerly chief engineer for *Smith Welding Equipment Corp.*, Minneapolis, has been promoted to manager of product research and development for that firm.

Rankin Manufacturing Co., Alhambra, Calif., has announced the promotion of **J. H. Holcin** to the post of regional manager of Eastern operations in charge of hardsurfacing sales.

Fred G. Outcalt has been appointed Sales Manager, *Linde Department, Union Carbide International Co., Division of Union Carbide Corp.* The sale of Linde Company products, as well as those of the other Corporate Divisions, is handled outside the United States and Canada by the International Company.

William D. Pollard has been appointed an abrasive engineer by *Norton Company.* Formerly a field engineer at St. Louis, he will call on accounts in western Missouri and northwestern Arkansas.

Carl B. Johnson has been named general manager of the newly formed *Armour Alliance Industries*, Alliance, Ohio. The

unit was formed by combining the Coated Abrasives, Cushioning Products and Adhesives operations of Armour and Company.

Joseph I. Doherty has been named manager of the Windsor, Conn., office and warehouse of *Whitehead Metals, Inc.*

Linde Company, division of Union Carbide Corp., has announced the appointment of two officers: **William B. Nicholson,** vice president, and **Robert F. Flood,** vice president—gas products.

Promotion of **Clarence H. Reinecke** to manager of the Milwaukee district office of the *National Cylinder Gas Division of Chemetron Corp.* has been announced. Reinecke was assistant manager and replaces **A. L. Breyvogel** who retired January 1st after 18 years with the company.

Robert W. Pressing has been appointed General Manager, New Products Department, *Linde Company, Division of Union Carbide Corp.* He was manager of Molecular Sieves Production and Development at Linde Company, Tonawanda, N.Y.

Donald F. Hastings has been named District Manager in Moline, Illinois, for the *Lincoln Electric Co.* He had been a welding engineer with Lincoln in San Francisco. **Donald Wright** moved from Chicago to replace Hastings.

Two promotions have been made by the *Abrasives Division of Elgin National Watch Co.*, Elgin, Ill. **Jack Wixiarde** has been named district sales manager for the Division's industrial diamond products and solid carbide rotary tools in Ohio, upper New York, Western Pennsylvania, West Virginia, Virginia and the Carolinas. **Robert DeDobbelaere** was named product sales manager — carbide tools. Announcements were made by **William H. Baudouine,** marketing manager for the Division.

continued on page 14

Here, in one compact bulletin, is the information that can help you choose the right cylinders for transporting and distributing all types of high-pressure gases—including oxygen, nitrogen, argon, ethylene and carbon dioxide.

Here, too, are related the facts that show why *deep drawn* high-pressure gas cylinders are most likely to save you money on shipping charges, handling costs and maintenance.

Complete data are given—showing styles, sizes, capacities of cylinders, and ICC specifications which Hackney cylinders far exceed.

Whether you serve industrial or medical customers, you ought to have this new bulletin handy as a guide to quality and as an aid in ordering your Hackney cylinders.

mail the coupon today!

Pressed Steel Tank Company
1473 S. 66th Street
Milwaukee 14, Wisconsin

Gentlemen: Please send the new bulletin at once. We are interested in facts and prices of Hackney high-pressure gas cylinders for ☐ industrial, ☐ medical service; in quantities 1 to 24 ☐, 25 to 99 ☐, 100 to 499 ☐, 500 to 999 ☐, 1000 or more ☐.

Firm Name.....

Your Name.....

Address.....

City.....Zone.....State.....

Pressed Steel Tank Company
Manufacturer of Hackney Products Since 1902
1456 South 66th Street, Milwaukee 14, Wisconsin
Branches in principal cities
CONTAINERS AND PRESSURE VESSELS FOR GASES, LIQUIDS AND SOLIDS
For More Information Circle No. 80 on Reader Service Card.

ATLAS... FIRST AGAIN!

NOW YOU GET 18% MORE CHIPPING EFFICIENCY ALONG WITH OTHER BIG ATLAS ADVANTAGES!

Everybody benefits from an improvement like new "WIDE BLADE," the welder, the owner of the business and even Atlas because new names will be added to the thousands already on our customer list.

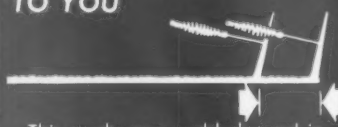
Why is Atlas always first with chipping tool innovations? It's simple as this—We are specialists. This is our principal business, not a side line. We are constantly looking for ways to improve weld cleaning techniques—to speed the job and do it better at less cost. Every member of the famous Atlas Line now has "WIDE BLADE," too!

Ask your welding supply dealer to show them to you.

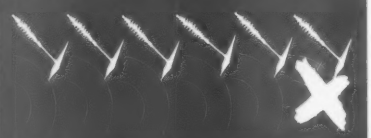
33 MODELS THEY ALL HAVE WIDE BLADES

WIDE BLADE

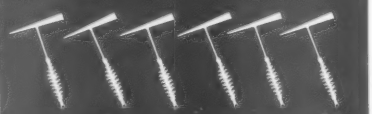
HERE'S WHAT 18% MORE BLADE WIDTH MEANS TO YOU



This much more weld cleaned in the same amount of time with the same amount of effort.



Sharpen less often. Tools last longer and non-productive time saved.



It's like getting a free tool every time you buy five, because the new wide blades wear longer.

ATLAS WELDING ACCESSORIES INCORPORATED
707 E. LEWISTON
FERNDALE 20, MICH.

For More Information Circle No. 10 on Reader Service Card.

MEN ON THE MOVE

continued

Smith

Goodfriend

Warwick

Bronco

APPOINTMENTS:

Rankin Manufacturing Co., Alhambra, Calif., has named **Edward C. Smith** district manager in charge of hard-surfacing sales in the Midwest. Smith will make his headquarters in Kansas City, Missouri.

Norris L. Goodfriend of Houston, Texas, has been appointed sales representative in the South Texas and Lake Charles, Louisiana, sections for *United Specialties, Inc.*, manufacturers of industrial hose and cable reels.

Joseph N. Kemple, general manager, *Page Steel & Wire Division, American Chain & Cable Co., Inc.*, Monessen, Pa., has two new assistants. **C. Laurence Warwick, Jr.,** will be in charge of production activities, while **T. P. Bronco** will be in charge of sales activities.

Gilbert L. Cox has been named technical manager of *Whitehead Metals, Inc.* He will make his headquarters at Whitehead's Rochester, N.Y., office.

P. A. Hawthorne has been appointed technical director for *Superweld Corp.*, North Hollywood, Calif., metal fabrication specialists.

continued on page 16

SMS CORPORATION

HEADQUARTERS
FOR

RESISTANCE WELDING SUPPLIES

R. W. M. A. CLASSES OF ALLOYS
IN CASTINGS, FORGINGS AND BAR STOCK &
COPPER TUNGSTEN ALLOYS

WELDER WHEELS IN ALL ALLOYS
AND SIZES TO SUIT YOUR REQUIREMENTS

ALL TYPES OF STRAIGHT AND OFFSET HOLDERS
STANDARD ELECTRODES

AND SPECIAL TO YOUR SPECIFICATIONS

ADJUST-A-PRESSURE HOLDERS

ADJUST-A-ANGLE ADAPTERS
FOR MULTIPLE SPOT AND INDIRECT SPOT WELDING

TIP DRESSERS, REAMERS AND CONTOUR DRESSERS

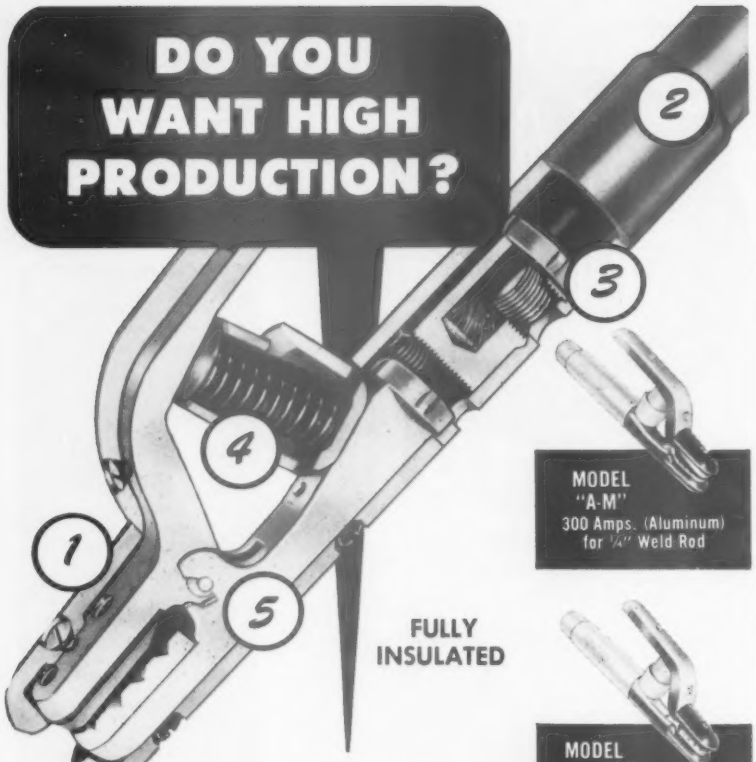
WE DESIGN AND BUILD SPECIAL ELECTRODES
AND FIXTURES

S-M-S CORPORATION

8605 LIVERNOIS AVENUE—DETROIT 4, MICHIGAN

For More Information Circle No. 88 on Reader Service Card.

DO YOU WANT HIGH PRODUCTION?



FULLY INSULATED

MODEL "A-M"
300 Amps. (Aluminum) for 1/4" Weld Rod

MODEL "C-S"
250 Amps. (Copper Alloy) for 5/32" Weld Rod

MODEL "C-M"
300 Amps. (Copper Alloy) for 1/4" Weld Rod

MODEL "C-L"
500 Amps. (Copper Alloy) for 3/8" Weld Rod

SuperGrip™ PRODUCES

more work, safer, easier!

SuperGrip Electrode Holders are designed to make easy all operations in welding...from attaching Holder to cable on through to depositing weld metal in any welding position!

YOU GET MORE out of *Super-Grip* for these reasons:

1 RUGGED, LONG WEARING interchangeable jaw insulators are easily replaced *QUICKLY*. Jaw pads of the aluminum Model "A-M" are easily replaced.

2 EXCLUSIVE NECKED-DOWN HANDLE cuts "cable fatigue" and "down time" by reducing cable play at handle end and close to cable connection...prevents fraying and fatigue of wire strands... makes *SuperGrip* firmer, handier working tool.

3 BALL POINT SET SCREW of "man-size" diameter really *grips* cable tightly...can be tightened without removing handle...provides maximum current-conducting cross section...minimizes re-connections to save time.

4 POWERFUL COMPRESSION of enclosed spring puts extra "bite" in *SuperGrip* jaws...minimizes electrode waste or loss.

5 PERMANENT PIVOT BUSHING in tongue of trigger assures alignment, minimizes wear and increases service life of the Model "A-M" Aluminum Holder. Positive grip helps produce more... better work.

Get our Bulletin No. 65 or...
Ask your Welding Distributor!

The FIBRE-METAL Products Company | CHESTER PENNA.

In CANADA: Fibre-Metal (Canada) Limited, Toronto

See us at The WELDING SHOW—Booth 434—Chicago

For More Information Circle No. 39 on Reader Service Card.

MEN ON THE MOVE

continued

ELECTIONS:

Roy T. Omundson has been elected a vice president of the *Chemetron Corporation*. Mr. Omundson is president of the company's recently formed *Cardox Division*, one of the major U.S. marketers of carbon dioxide products.

SALES MEETINGS:

Regional sales managers of *All-State Welding Alloys Co.* held their annual sales meeting recently at company headquarters in White Plains, N.Y. The four-day session included practice welding with the company's new hard surfacing rod, films, discussion of new welding techniques and a trip to All-State's aluminum wire mill in Connecticut.

DEATHS:

Merrill "Ken" Good, 47, manager of electrode sales for *Hobart Brothers Co.*, Troy, Ohio, died suddenly on January 25th after a heart attack suffered at his desk. Good joined Hobart in 1944 in the electrode sales department and was subsequently appointed sales manager.

CORRECTION:

This is **Tom Earlbeck,** welding technician trainee, at *Earlbeck & Landrum, Inc.*, Baltimore, Md., welding supply distributor. Tom, son of **Al Earlbeck** was incorrectly identified as "Landrum" in the February issue of INDUSTRY & WELDING.

For More Information Circle No. 48 on Reader Service Card.

for critical welding

P&H Combination AC-DC Welders

with ON-OFF automatic high frequency

These dual-purpose welders are ideal for super-critical welding because they offer you:

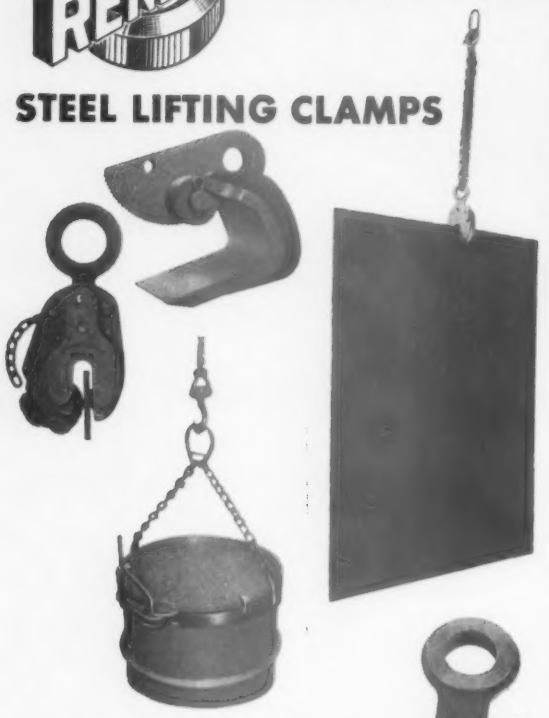
- pre-set gas and water timing
- foot-operated remote heat adjustment and primary contactor control
- high-frequency intensity and phase-shift rheostats
- ON-OFF soft start
- specially built sequence timing for any requirement

Get the complete work- and money-saving story. Write to:

P&H HARNISCHFEGER
WELDERS · ELECTRODES · POSITIONERS
Milwaukee 46, Wisconsin

RENFROE Safety Snap Lock

STEEL LIFTING CLAMPS



HANDLE STEEL WITH SAFETY

√ Maximum Speed and Safety
√ From ½ ton to 20 ton sizes
√ Lock on in any position
√ Lock off in any position
√ Exceptionally light in weight
√ The toughest clamp ever built
√ Takes the place of welded pad eyes and screw clamps
√ Cannot be accidentally knocked off
√ Safety Factor 5 to 1

A Superior Line of Steel Lifting Clamps designed to meet today's demand for handling steel with maximum SAFETY and EFFICIENCY.

WRITE FOR COMPLETE CATALOGUE

J. C. RENFROE & SONS, INC.
1259 WEST STATE STREET • P. O. BOX 4279
JACKSONVILLE, FLORIDA

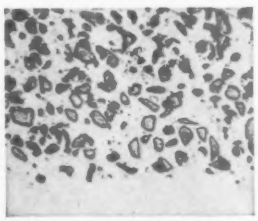
For More Information Circle No. 84 on Reader Service Card.

A hard-surfacing alloy with maximum abrasion resistance—

Colmonoy® No. 75 Tungsten Carbide Sprayweld® Powder

Maximum abrasion resistance can now be given fast-wearing metal parts by providing hard surfaces of Colmonoy No. 75. This nickel-base alloy adds the high abrasion resistance of tungsten carbide particles to the excellent wearing properties of its other hard constituents, chromium boride and chromium carbide.

Heavy bearing surfaces suffering from abrasion and corrosion, (such as shafts, sleeves, bushings, polishing fixtures, automated machinery parts, and core barrels) gain greater service life with Colmonoy No. 75 hard surfacing. Like all Sprayweld Powders, it is applied with the Colmonoy Spraywelder. The sprayed overlay is torch fused to the base metal, producing a smooth non-porous deposit. Install a Spraywelder or ask us about the job shop nearest you. Write for Engineering Data Sheet No. 21.



Photomicrograph (25X) shows the tungsten carbide and other smaller hard constituents dispersed in the nickel-base matrix. Relatively clear lower area is base metal. Tests prove Colmonoy No. 75 provides maximum carbide content consistent with good bearing quality, and with maximum deposit efficiency.

HARD-SURFACING AND BRAZING ALLOYS
WALL COLMONOY
CORPORATION
19345 John R Street • Detroit 3, Michigan
BIRMINGHAM • BUFFALO • CHICAGO • HOUSTON • LOS ANGELES
MORRISVILLE, PA. • NEW YORK • PITTSBURGH • MONTREAL • GREAT BRITAIN

For More Information Circle No. 108 on Reader Service Card.

You get VICTOR QUALITY thru-out this package

We've assembled the Super-Range unit for the man who wants a first-class, complete outfit, ready to handle a full range of shop work—welding, cutting, heating, brazing, soldering. Everything needed to go right to work is included.

Every item listed is Victor's standard, top-quality apparatus . . . and you get the complete outfit for only $99.00. Order from your Victor dealer now.

Profitable dealerships open in a few areas: inquire now.

Two Victor single-stage safety regulators,
Model SR 210-970 Acetylene
Model SR 200-967 Oxygen

Victor welding torch Model 100

Victor cutting attachment Model 550-100

Victor welding torch nozzles, Type 13, sizes 0, 2, and 4; (welds to ¼")*

Victor cutting tip, Type 5-101, size 1; (cuts to 1")*

12½ ft. dual welding hose, 3/16" diameter

Spark lighter, goggles, and wrench

*By adding Victor nozzles and tips of larger or smaller capacities to Super-Range unit, you can greatly increase the working range.

VICTOR
for welding

VICTOR EQUIPMENT COMPANY

Mfrs. of welding & cutting equipment; high pressure and large volume gas regulators; hardfacing rods, blasting nozzles; cobalt & tungsten castings; straightline and shape cutting machines. 54

844 Folsom St., San Francisco 7 • 3821 Santa Fe Ave., Los Angeles 58 • 1145 E. 76th St., Chicago 19

J. C. Menzies & Co., wholly owned subsidiary

For More Information Circle No. 105 on Reader Service Card.

TIG welding is "right" for so many jobs...

Stainless steel coffee jugs for the Air Force have smooth, high-strength welds produced by TIG welding

All-aluminum water towers feature rugged TIG welding of vertical tank sections

...and Sylvania Tungsten Electrodes do the job right...everytime!

From coffee jugs to aluminum water towers—Tungsten Inert Gas welding is adaptable to almost any job. But the quality of the weld is only as good as the tools you use . . .

That's why TIG welders prefer Sylvania Tungsten Electrodes. You can take your pick of all 4 electrode types: Puretung®, Zirtung®, 2% Thoriated, 1% Thoriated. They're available with cleaned or ground finish. And they're color-coded to prevent waste and costly errors.

Sylvania Tungsten Electrodes—the only complete line—are available through all leading distributors. Call yours today.

SYLVANIA

Sylvania Electric Products Inc.
Chemical & Metallurgical Div.
Towanda, Penna.

TUNGSTEN • MOLYBDENUM • CHEMICALS • PHOSPHORS • SEMICONDUCTORS

For More Information Circle No. 92 on Reader Service Card.

The ALL NEW MID-STATES *Magna-Tran* WELDERS

for Inert Arc Welding and AC / DC Welding

THE MAGNA-TRAN is a new line of welding machines incorporating many unique features. Basically, it is a single phase AC transformer welder that can easily be converted into an AC/DC or an AC/DC inert arc welder—either in the field or at the factory.

AC/DC WELDER: Meets the need for all-around manual welding. Either the AC or DC amperages may be remotely controlled by a foot or hand rheostat. This is made possible by Magna-Tran's patented "Flux Density" control.

AC/DC INERT ARC WELDER: By making use of the high frequency voltage built into the machine, it readily becomes an inert arc welding machine. The special "PLUG IN" control panel makes it possible to include gas pre-flow, high frequency drop out, gas post-flow and spot arc in the fundamental inert arc welder by merely plugging in the appropriate timer.

The panel is clearly marked and the timers are as easy to change as a radio tube. No costly wiring changes are required. It becomes unnecessary to return the welding machine to the factory for conversion.

Other features include:

VERY STABLE ARC: Especially noticeable on inert gas and at low amperage settings.

STEEP VOLT-AMP CHARACTERISTICS: Provides steady current under varying arc lengths.

LOW MAINTENANCE COSTS: Unit-built high frequency and control panel may be easily removed for servicing and replacement in the field by removing the plug-in drawer assembly.

Easy accessibility of front drawer panel to adjust timers.

Gas and water valves are easily removed for inspection and maintenance by unplugging the assembly.

MID-STATES
WELDER MFG. CO.

M S

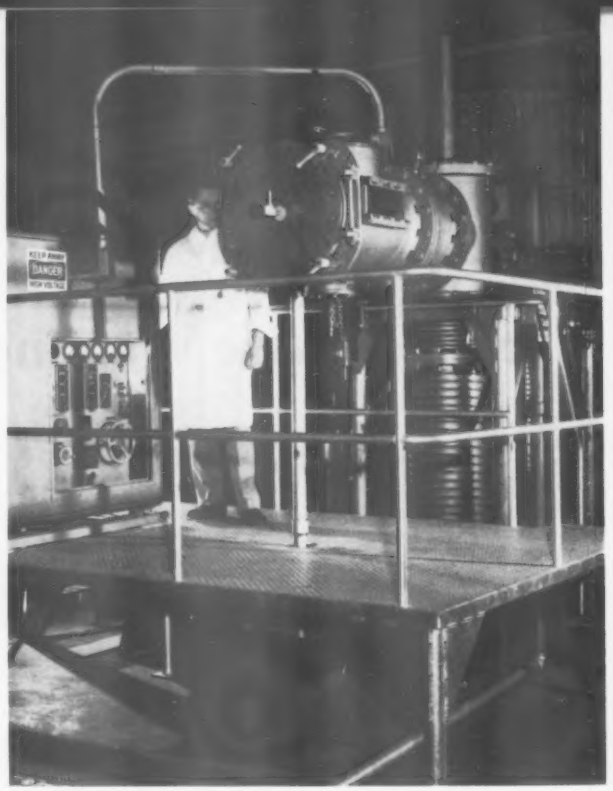
6025 South Ashland Ave. • Chicago 36, Illinois

For More Information Circle No. 74 on Reader Service Card.

WELDING AT WORK

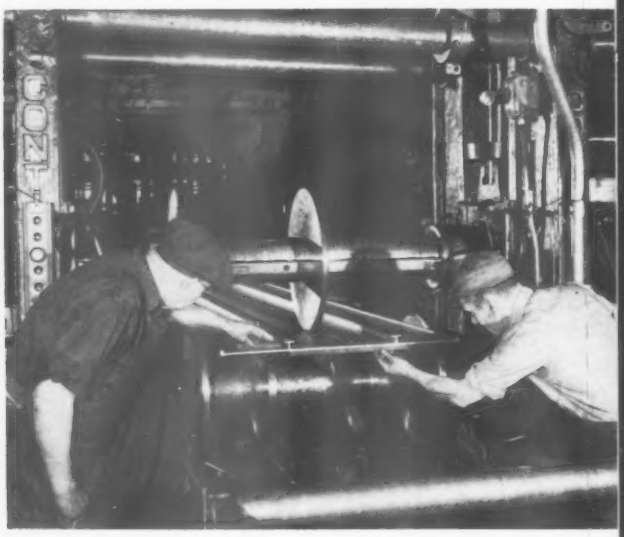
to do the job better and cheaper

Electron beam welder joins reactive metals



NEW YORK CITY: This electron beam welder designed by Air Reduction Company joins reactive and high-melting-point metals. It applies a high intensity electron to weld beryllium, molybdenum, tantalum, zirconium, hafnium and all other exotic metal which before this could not be welded satisfactorily, or were very difficult to weld.

The electron beam bombards the materials to be welded in a very high vacuum chamber. The use of a high vacuum makes it impossible for the metals to be contaminated by the atmosphere during welding. The size of the beam—as small as 1/16-inch diameter—can be controlled to a degree unattainable before. Resultant welds are stronger, more ductile and have improved contours.



Titan ICBM missile is clad in welded aluminum skin

PITTSBURGH, PA.: The intercontinental ballistic missile Titan, most powerful missile developed and successfully fired in this country, is clad in light, tough aluminum skin fabricated from metal supplied by Aluminum Company of America.

First ICBM with an aluminum exterior, the Titan was designed and built for the Air Force by the Martin Company's Denver Division. Walls of the propellant tanks in the Titan also form the missile's outer skin, becoming an integral part of the airframe. They are fabricated from large extrusions produced on a 14,000-ton press at Alcoa's Lafayette, Indiana, works.

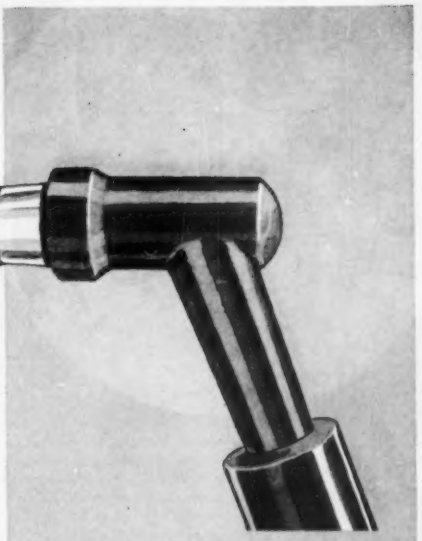
The integrally stiffened extruded shapes emerge from the press as 20-foot long inverted vees (above, left). They are flattened into 34-inch widths (above, right) and shipped to Martin for stretch-forming, chemical milling and welding.

the TOP TIG welding TRIO

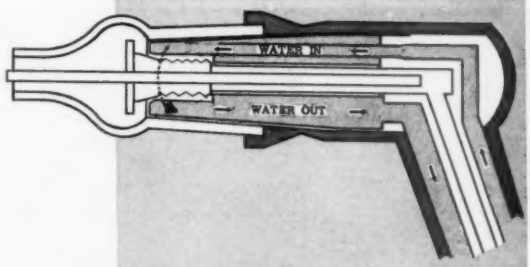
the torch

TEC VISUWELD TORCH

The proven tungsten inert gas welding torch contains all these exclusive features: the lightest weight . . . only 3 ounces . . . maintenance free . . . no parts to wear or leak . . . 3 to 350 amps. . . . topped with a Visuweld transparent gas nozzle which presents a clear, unobstructed view of the weld area at all times.



Unparalleled tip-of-the-torch cooling system continuously releases cool water where it's needed most . . . at the tip-of-the-torch. Guaranteed gas and water leakproof due to one piece torch head construction without "O" rings, threads, or gaskets.



the gun

TEC SPOT GUN

This TIG spot welding tool perfectly bridges the gap between resistance welding and TIG arc welding. The TEC Spot Gun has been designed to increase production output and replace expensive spot welding operations. The lightest weight, most compact spot gun ever made, it comfortably fits the operator's hand. Weld up to, and including ⅛" thickness to any size stock and in any joint design. There are no movable parts to wear or replace, permitting maintenance free operation. Touch starting is replaced by high frequency arc starting, reducing electrode waste and work contamination.

the control

TEC SPOT CONTROL

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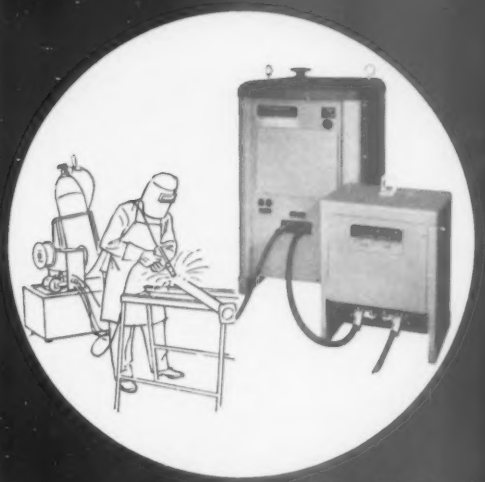

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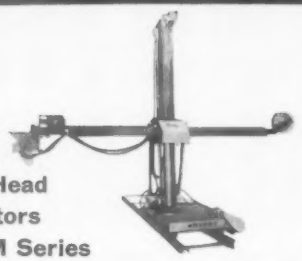

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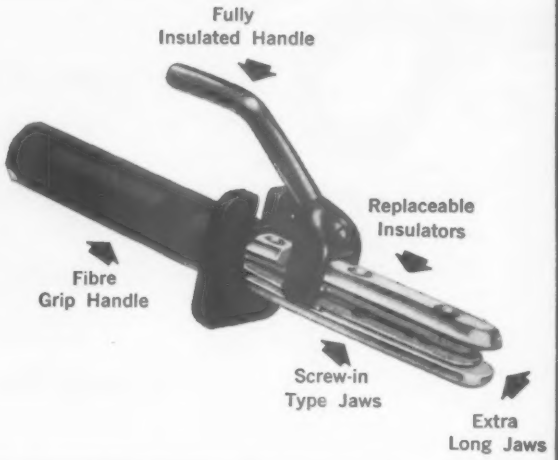

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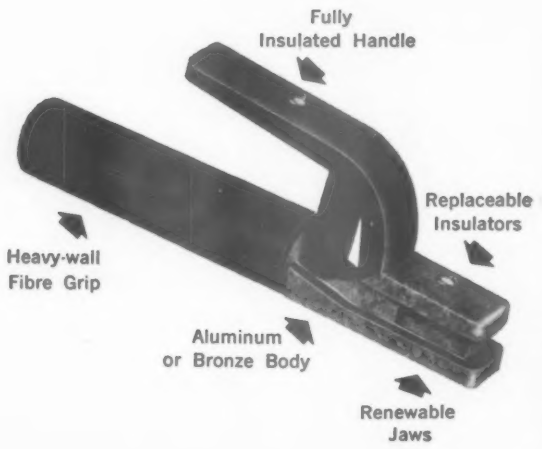

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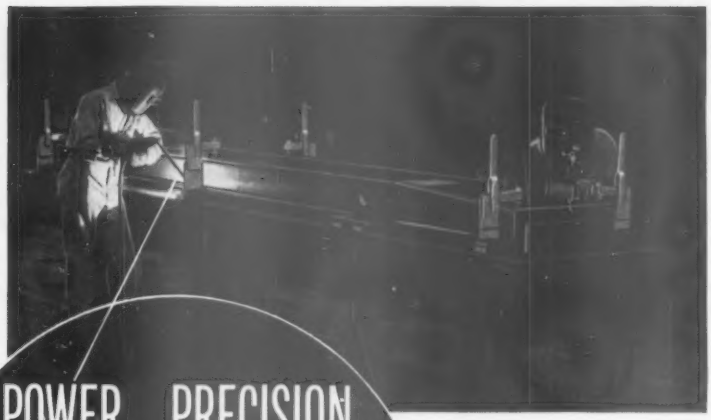

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BRAZED SANDWICH CONSTRUCTION

"Development of Brazed Sandwich Construction Materials for High Temperature Applications" (PB-151272), C. F. Burrows and F. J. Ragland, Jr., The Martin Co. for Wright Air Development Center, U. S. Air Force, July, 1958, order from OTS, U.S. Department of Commerce, Washington 25, D.C. It contains 105-pages; price $2.50.

A brazed honeycomb sandwich construction for structural use which withstands operational temperatures up to 1200°F has been developed for the Air Force, according to this report just released for industry use through the Office of Technical Services, U. S. Department of Commerce.

The successful base-braze metal combination was Type A-286 steel, an austentitic super-alloy containing titanium and aluminum, brazed with a nickel - chromium - silicon - iron - boron alloy. At operational temperature from 1000 to 1200°F, this combination showed excellent structural and fatigue properties.

Two sandwich combinations were satisfactory for use in temperatures up to 700°F. They were type 422 steel, a modified 12-percent chromium martensitic stainless, brazed with 85 silver-15 manganese modified with lithium; and type 17-7 PH steel, a precipitation- hardening martensitic alloy containing aluminum, brazed with 93 silver-7 copper modified with lithium.

Satisfactory pre-formed and resistant welded honeycomb core was made from all five of the corrosion-resistant steel alloys used in the study. It was found that static flexure, edgewise compression and flexural fatigue tests provide fairly significant and reliable data on brazed sandwich construction.

ARC WELDED PROJECTS

William A. Sellon, Bemidji State College. Publisher: The James F. Lincoln Arc Welding Foundation, Cleveland 17, Ohio. Price: 50c, postage paid in U.S.A., 75c elsewhere.

The James F. Lincoln Arc Welding Foundation has published *ARC WELDED PROJECTS, For the School Shop*, as an aid to arc welding practice in industrial arts shops and as a stimulus to welded project design. The book contains information for making 25 useful and interesting shop projects. A photograph, bill of material, construction suggestions and detailed plans are given.

In size and format the booklet is a companion publication to *ARC WELDING, A Basic Manual of Instruction for Learning How to Use Arc Welding.* The large 8½ by 11 inch size makes for easy reading. The 46 pages are bound in a sturdy, lacquered paper stock and are punched for easy filing.

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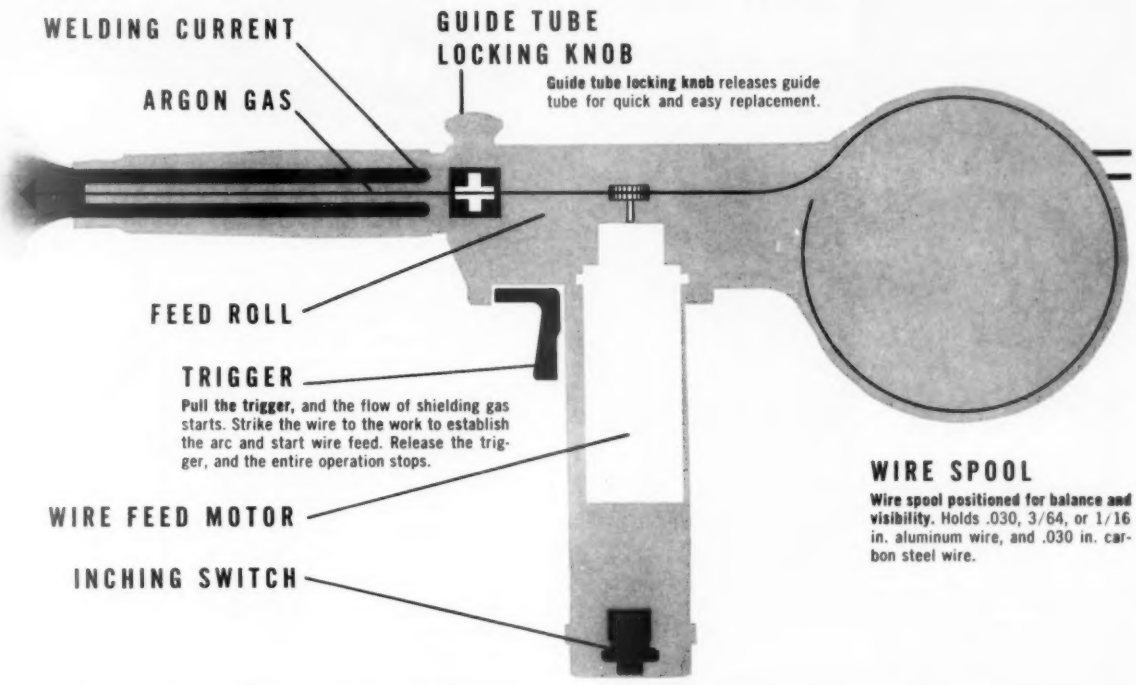
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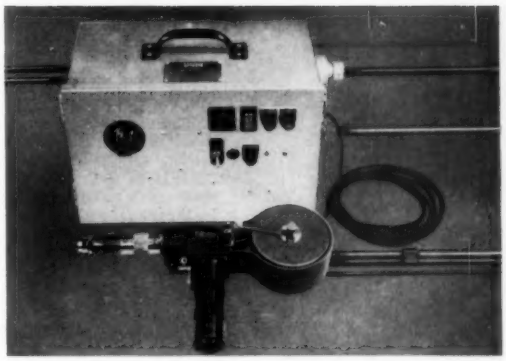

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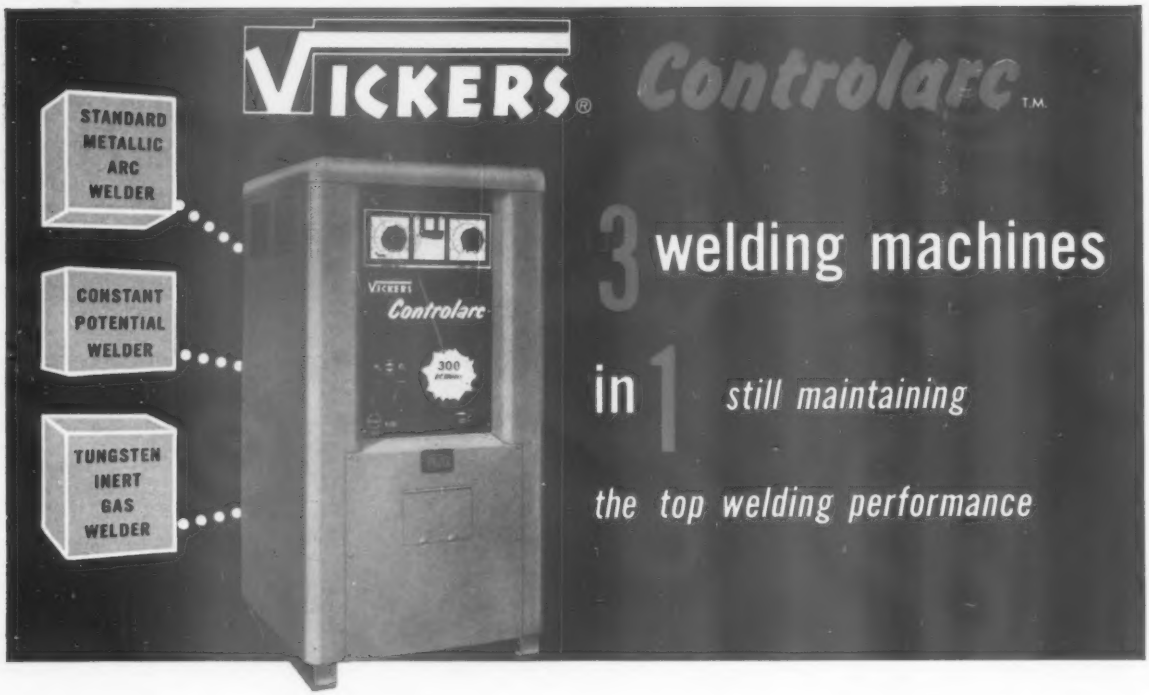

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Industry & WELDING
APRIL, 1959

Welding Distortion: What Causes It And How To Cure It

by **LOUIS J. LARSON**, *consulting engineer, Allis Chalmers Mfg. Co., Milwaukee*

IN BRIEF: An expert tells how to control distortion and shrinkage in welded fabrications and how you can even make it work to advantage.

DISTORTION IS A BIG PROBLEM in welding, but there are two ways of getting around it: Prevent it during welding, or iron it out by straightening it after welding.

Which one is best? The answer depends on the problem; some applications demand preventative treatment; correction will suffice in others. It may seem more logical to prevent distortion from occurring in all cases, but it is often less costly to weld, then straighten.

The law governing distortion can't be repealed; metals expand when heated, contract when cooled. The amount of expansion is proportional to the thermal coefficient of the metal. For steel, a 1-inch long piece will shrink .014 inches in cooling 2000°F.

When a groove is welded, the molten metal fills the groove. If this metal could cool without base metal restriction it would shrink in three directions—and the metal wouldn't fill the groove when cool.

But the metal is fused to the sides and the bottom of the groove, so it can't shrink freely. Thus, either the weld metal must stretch, or the base metal compress. Actually, both happen. While the weld metal is hot it will stretch easily, but as it cools it gets stronger and stronger, finally reaching full strength at about 700°F. Thus, the shrinking weld metal exerts a heavy pull on the groove sides and distorts the weldment.

The first pass in a groove between two butted steel plates shrinks quite freely, since there is very little base metal below it. The plates draw together but are not visibly distorted. The second pass is more restrained; it must compress the first in order to pull the plates together more. Even this does not produce much distortion because the weld can still shrink. But after several layers have been deposited, the weld metal cannot shrink without compressing all the metal below the last pass. Result: a moment about the longitudinal axis of the weld and lifting of the plate edges. This condition gets worse with more passes.

One of three methods can prevent or counter this distortion: 1. Clamp the plates rigidly; 2. Position the pieces to allow for distortion; and 3. Use a symmetrical (double V or U) groove. By alternating passes in the latter, distortion can be held to almost zero.

These methods will keep a plate flat, but they won't stop weld shrinkage; you can only allow for this. Two ways are: Make components oversize; or provide a space between abutting edges.

When these steps cannot be taken, there is another effective (but high labor) remedy: Peening. If done properly, peening will spread the weld metal enough to offset shrinkage, and eliminate warpage too.

Cylinders are common weldment components. For example, they can be big (approximate

LOUIS J. LARSON *holds an MA from the University of Illinois where he also served on the faculty. He joined A. O. Smith Corporation, becoming Director of Welding Research during development of first modern types of coated electrodes for welding carbon and a number of low alloy steels. In 1942, after several years as consulting engineer to major Milwaukee area companies, Mr. Larson joined Allis Chalmers Mfg. Co., Industries Group, as welding consultant. He planned and directed welding of equipment for the Oak Ridge Manhattan Project and developed welding procedures for Navy gas and steam turbine components. He is a member of AWS, ASTM, ASM, ASCE, and NSPE.*

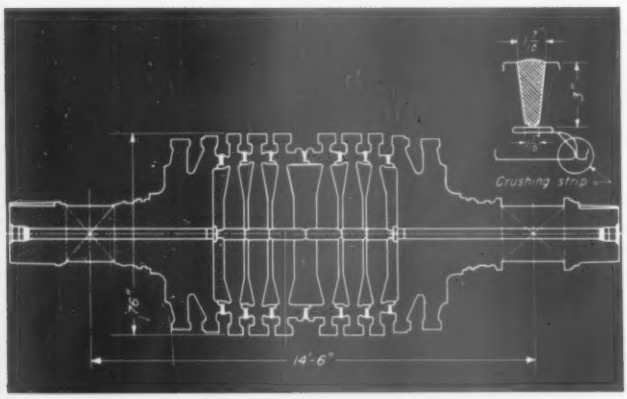
shipping size, 14-feet across, several inches thick) or small (20 inches or less in diameter, ¼-inch thick and 40 feet long, like pipe). The type and amount of distortion depends on the size and the thickness of the material. Thick cylinders flatten at the joint if welded from the outside only. They can't be clamped, but a balanced weld will hold distortion down. Another solution is to reroll them to correct the distortion.

Thin materials act differently. After welding, pipe flattens elliptically in the center and peaks at the ends. Even rigid clamping can't eliminate this. Thus, it's a common practice to size pipe after welding, either externally in a die which stresses the material beyond its yield point, or internally, by hydrostatically forcing the pipe to fill a die.

In welding structural or machinery assemblies like bases or pedestals, study the structure and analyze the effects of welding before setting up for distortion control. For example, a pedestal consisting of a flat base plate with grid work welded to one side should be fabricated in subassemblies. Weld the several-piece base plate first using a procedure which keeps it flat. Next, assemble and weld grid plates in a distortion-preventing sequence. When the two assemblies are joined, the structure will show little distortion.

A welded steam turbine spindle is an example of a structure for which very accurate control of distortion was required. Usually a solid forging, this 100,000 lb. spindle was welded to speed delivery. By fabricating the spindle from separate disks and end sections (see drawing), smaller, more thoroughly worked and readily available forgings could be used. But distortion was a serious problem.

The spindle had to be kept straight to prevent balancing troubles later. Unless the center of every disk was kept accurately on the axis of rotation, the spindle wouldn't balance. This meant the necessity of uniform shrinkage across the weld. If not uniform, a bend or kink would result. Besides this, the total amount each weld could shrink had strict limits. Uncontrolled shrinkage across the weld might exceed ⅛-inch; this could make the spindle as much as an inch too short.



CLOSE DISTORTION CONTROL was required on this steam turbine to hold balance and length. A crushing strip design absorbed shrinkage and prevented weld cracks.

Setup procedures were careful ones. Disks were machined with metal-to-metal male-female fits to insure concentricity. They were kept parallel with machined axial contact surfaces.

Disk spacing was controlled by their axial dimensions. A small ring-projection extending around the circumference of the axial fit was the only contact. This 1/16 by 1/16-inch projection supported the disks during vertical assembly but was designed to crush with weld shrinkage. (A large contact area would limit weld shrinkage and the welds would probably crack). It is significant that there were no cracks with the use of the crushing strip.

Before and during welding disk spacing was checked to determine how much the welds were shrinking. Peening was used to limit shrinkage and to keep it uniform around the circumference. So successful was this method of controlling distortion, the finished spindle was only 2 lb. out of balance.

Preheat was required for the entire welding operation because the spindle was made of low alloy steel. The assembly was furnace heated to about 600°F, then placed in an enclosure for welding. During welding and until the weldment was stress relieved, its temperature was held to 500°F minimum. The enclosure had openings at top and sides to provide access for welding, cleaning, peening and shrinkage measurements.

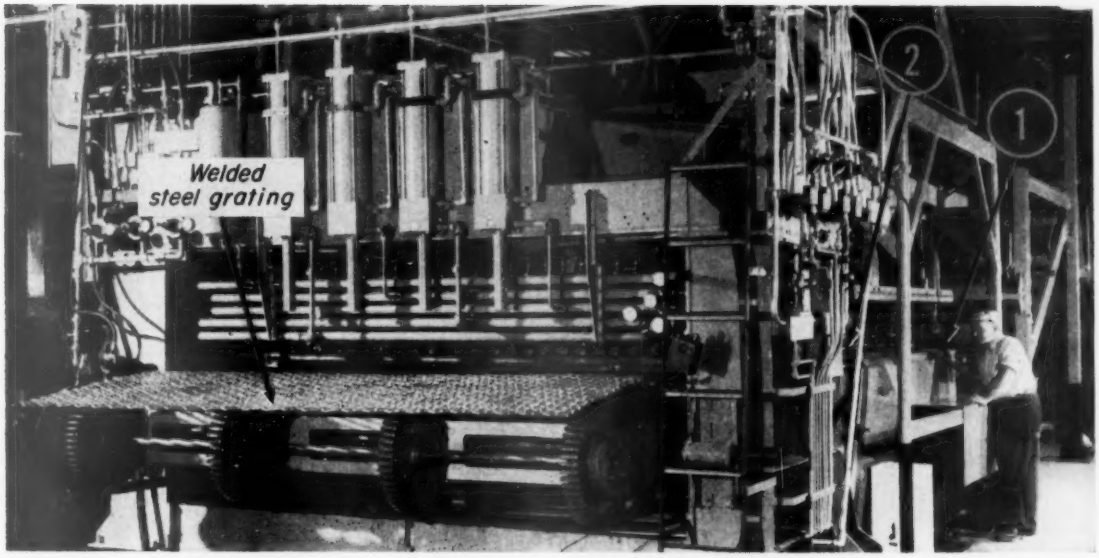
Several small, high alloy steel spindles were welded with similar procedures and equally good results.

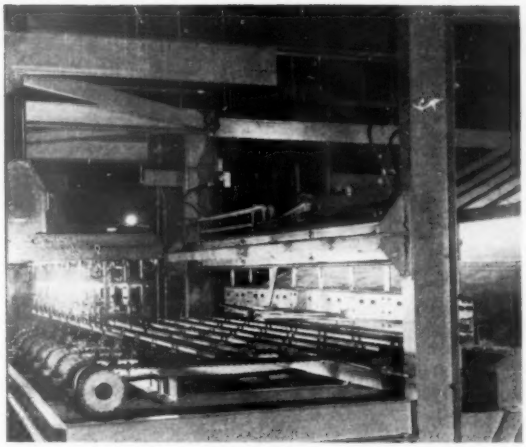
Hollow shafts made of carbon steel centers and high alloy steel ends were kept straight by close distortional control. They were set up in a lathe so that the central section ran true. After a layer of weld metal was deposited, the runout of the end section was checked and the weld peened until the shaft was straight.

Sometimes machining discloses defects in large castings (like steam turbine cylinders) and repair welding is required. This is a case where peening is about the only effective way of controlling distortion. Careful measurement of critical dimensions before and during welding determine the degree of peening.

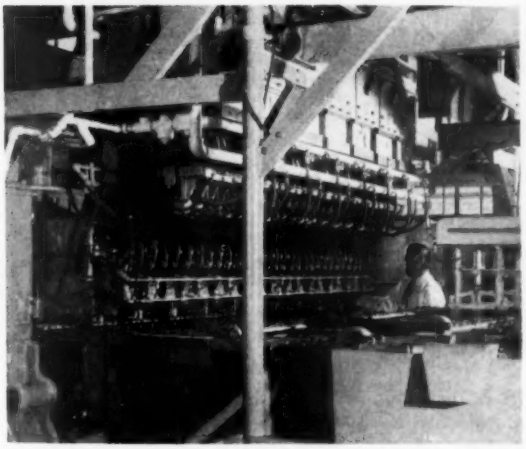
Usually a nuisance, distortion actually aided a field repair job in one instance. A riveted ball mill shell cracked half way around near the center, kinking there, and causing the trunnions to run out of true. In making the repair, a procedure was used which produced the maximum shrinkage across the weld. The distortion coun-

continued on page 67





1 Notched steel bars (126-inches long) are gravity-fed to conveyor. Finger lift bars take them to zig-zagger.



2 Steel bars are welded in 14-ton resistance welder. Special index table positions bars to get honeycomb pattern.

700 KVA Machine Fabricates 10-Tons Of Grating in 8 Hours

IN BRIEF: Accurate automatic loading, precision notching and forming and automatic resistance welding makes possible high volume production.

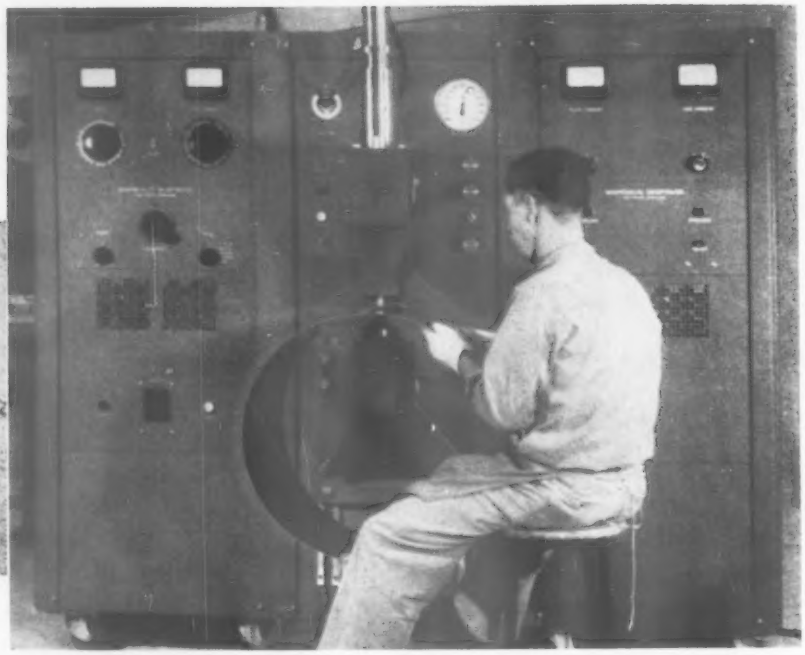
AUTOMATIC RESISTANCE WELDING with automatic transfer mechanism turns out non-skid safety grating at Bustin Steel Products, Inc., Dover, New Jersey, at high speeds.

Capable of producing industrial grating at a rate of 5000 square feet, or 10-tons, continuously in an eight hour day.

The machine needs no operator and no attention beyond occasional checks by a specially trained maintenance engineer. It will do the work that once took 24 operators.

Seven years have been required to bring the machine to its present state of operation, according to Leo Bustin, president. Initially, a model one-third the size of the completed machine was made for developing the progressive feeding and indexing mechanisms. The model

continued on page 95



2000 WATT PRODUCTION MACHINE welds a 24-inch cylinder made of .050-inch thick 2024-T3 Alclad. Photomcrograph (left) shows an ultrasonic weld between .008-inch thick gold-platinum and .010-inch pure nickel.

Ultrasonic Welding: Theory And Practice

by **J. R. WIRT,** *welding engineer, Delco-Remy Division, GMC*

IN BRIEF: Aluminum, platinum, moly and other metals can be welded ultrasonically without alloying of base metal microstructures

ULTRASONIC WELDING has come of age. And it has carved a place of its own; it supplements rather than competes with the other welding processes. A sign of this progress: four years ago 2023-T3 aluminum couldn't be ultrasonically welded and meet MIL-W-6860 specifications; today thicknesses up to .090 inches are welded and more than meet the strength specs.

The process appears to be best suited for welding nonferrous metals like: aluminum, silver, gold, platinum, copper, brass, molybdenum, tungsten, and the exotic high strength, heat resisting alloys.

One ultrasonic application is the welding of .0003 to .005-inch thick aluminum foil, to itself and to copper, to form electrical connections. The foil could be welded to itself by the resistance process, but this isn't practical since control is so critical. Cold welding, using pressure but no heat, has been used, but this method requires perfectly clean material; a finger print will prevent welding.

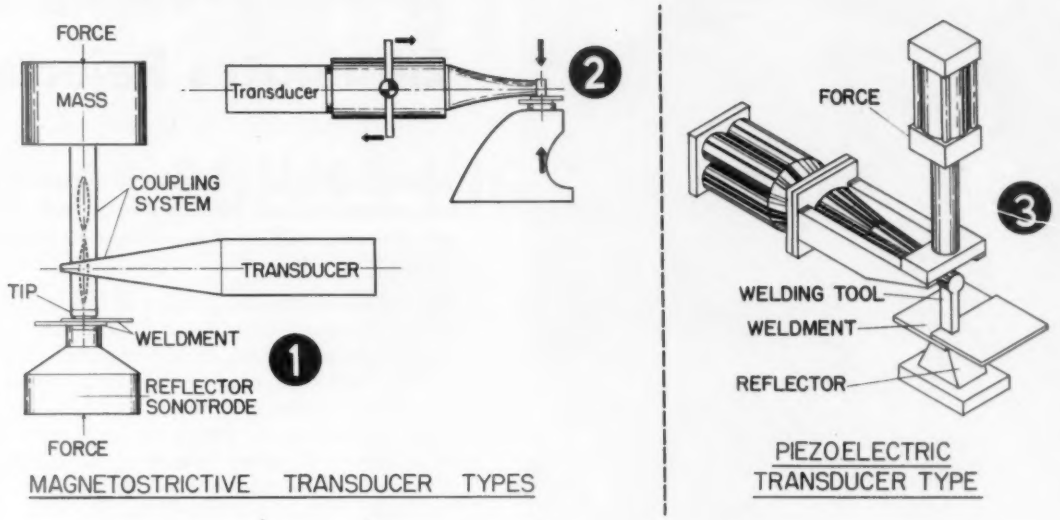
Ultrasonic welding is not as fussy. We have even made welds through paper, .002 inches thick, but we don't let the foil become too dirty.

When aluminum foil is resistance welded to copper a small amount of alloying between them will cause joint failure in a humidity test (100% at 100°F in 72 hours exposure). The aluminum sacrifices itself to protect the joint and while the weld is sound, it is no longer connected with the aluminum base metal. This is no problem with ultrasonic welding; the aluminum and copper penetrate each other intergranularily with little or no alloying.

Sonic or sound waves, shaped much like electrical waves, are produced mechanically. They are propagated in conductors which must have elasticity—a vacuum will not carry sound. Sound travels at different speeds in different metals; conductivity varies with the ability of small material particles to respond to sound wave energy. Sound is the vibration of these particles and may spread until the whole structure vibrates. When it does, the resonant frequency has been found.

The experts do not agree on the mechanics of

Transducers deliver mechanical energy to the force system



TYPICAL FORCE SYSTEMS are magnetostrictive-type transducer connected to quill-type sonotrode (left), the largest of which is rated at 2000 watts; a pivot-mounted force system which vibrates horizontally (middle) and a piezoelectric flange-mounted transducer with the force system constructed to produce horizontal vibrations (right).

an ultrasonic weld. One group says plastic flow makes the material migrate across faying surfaces, another group holds that superficial melting causes intergranular penetration.

Micrographs prove intergranular penetration and tests show that there is some heat generated at the joint, but austempered AISI 1065 steel has been joined to a high melting (6500°F) refractory material without affecting the metallurgical structure of either material. If there was enough heat to melt the material it is probable that the grain structures of both materials would be visibly changed.

How is the weld made? Apparently sound energy accelerates the small material particles beyond the ability of the base metal to hold them and they are forced between grains of the adjacent material.

An ultrasonic welding machine has a power source capable of producing variable high frequency, a force system to which a transducer is connected, and a timing or control circuit.

The transducer converts high frequency alternating current into mechanical energy which is introduced into the force system to generate the welding sonic waves.

There are two kinds of transducers—magnetostrictive and piezoelectric. Both are capable of making good welds. The magnetostrictive type consists of a stack of rectangularly-shaped nickel laminations and two electrical coils. One coil carries direct current which polarizes the stack. Thus, the stack responds to high frequency alternating current introduced into the second coil. With the right power the nickel changes size in all directions in response to the applied frequency.

The piezoelectric material (barium titanate) has direct response to alternating current without the need for continuous polarization, and changes size in resonance with the applied frequency.

A typical ultrasonic force system of the magnetostritive type has a transducer connected to a quill type sonotrode at a point which produces the greatest energy at the working face of the sonotrode. The weldment is placed on the reflector and force is applied to hold the parts firmly together during welding.

Ultrasonic welders are available as:

1. Laboratory type equipment.
2. Production machines. One is designed for welding cooling fins to both sides of an aluminum extrusion. It has four welding heads which progress across the work, then index to make a pass in the opposite direction.
3. Continuous seam welders.
4. Precision machines for welding wires as small as 1 mil diameter.
5. Portable spot welders.

Some of the heaviest rated ultrasonic machines are those having two transducers which use 4,000 watts power. • •

This article is based on a paper presented at the recent Midwest Welding Conference held in Chicago by the Armour Research Foundation of the Illinois Institute of Technology.

AUTOMATIC WELDING MACHINE pours weld metal into joint between end fitting and barrel as it spins slowly in massive three-jawed chuck.

MANUAL TUNGSTEN ARC WELDING adds attaching points to the thrust brace's end fitting.

Automatic Equipment Speeds Welding, Eliminates Rejects

IN BRIEF: When Ryan switched to automatic welding, rejects dropped from 84 percent to less than one percent; welding time was cut 90 percent.

THE TOP OPERATIONAL BOMBER in the world today is the Boeing B-52. The 400,000-pound bulk of this big bomber and its 150-knot landing speed give it a concrete-cracking landing impact that's measured in the millions of foot-pounds. Four sets of massive landing gear help soak up the punch and 10 thrust braces of vanadium steel help carry the load from the landing gear to the fuselage. Ryan Aeronautical Co., San Diego, California, has supplied Boeing with these thrust braces since 1952.

The braces are tough, well-designed, precision-made and thoroughly inspected to make sure they can take this day-in, day-out jarring.

Problem 1: As originally designed, braces were made in four parts: two half shells, which were welded together longitudinally to form the five-foot barrel, and two end fittings with attaching points, which were welded on each end of the barrel to complete the assembly.

The barrel halves were joined by butting and holding in position with a chill bar attached to the underside of the joint with studs. This proved unsatisfactory. Barrel halves cracked in the stud area requiring grinding and welding of the crack. Further, since metallic arc welding was used, porosity developed where the weld was started or stopped each time electrodes were changed. This showed up in radiographs and had to be ground and re-welded.

Solution 1: An attempt was made to join the halves with manual tungsten arc welding. With this type joint getting the operator to deposit the weld metal at the proper speed was a problem. If the operator was not sure of his timing —overheating often resulted and caused porosity. Ryan solved the welding problem by replacing barrels with seamless tubing, whose ends were swaged down to accommodate the end fittings.

Problem 2: At first, end fittings were welded to the barrel ends in short passes, filling up the seam area. As with the barrels, a porous spot developed at each place the weld was started and stopped. This porosity had to be ground out and filled.

Solution 2: Ryan set up three special fixtures.

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Lincoln

WELDYNAMICS

NEWS ABOUT ARC WELDING AT WORK CUTTING COSTS

ATLAS SOLVES HIGH COST PROBLEMS

High welding costs were eating away at profits and making it tougher to bid competitively on heavy fabricating jobs at the Atlas Machine and Iron Works in Arlington, Va.

Werner Quasebarth, production manager and his brother, Bill Quasebarth, plant engineer, decided immediate action had to be taken. Since most of the work coming out of their shop is welded, it was natural that their welding operations come under scrutiny first.

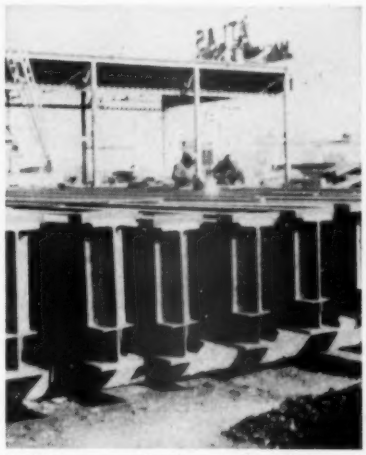
To help them analyze all their welding procedures and processes they asked Jim Clauson, a welding engineer from Lincoln, to conduct a survey of their shop in an effort to pinpoint inefficiencies.

Bill Quasebarth and Jim Clauson checked every welding operation in the shop. They compared electrodes and processes for operating factor, speed, weld quality and appearance. As a result of the survey several improvements were made which are expected to pay off in cost reductions of ⅓ or more.

Bill Quasebarth, Plant Engineer, found the way to cut costs and improve the product.

Bridge bearings are welded manually with iron-powder Jetweld electrodes.

The most dramatic improvement was made on the process for welding cover plates on girders. Welding manually, Atlas welders have been able to complete 12 actual feet of $\frac{5}{16}$" fillet welds per manhour. By utilizing two Lincoln Mechanized "Squirt" welders which are capable of welding 50 feet of $\frac{5}{16}$" fillet per machine hour, Atlas was able to increase overall production 50% on this operation.



Welding cover plates on bridge girders. A switch to semi-automatic has upped production 50%, improved weld quality.

For short welds, not accessible to the semi-automatic or automatic machines, iron-powder Jetweld electrodes were found to offer greater speed, higher operating factor and better welds.

Werner Quasebarth says, "We're grateful to Lincoln for helping us with our cost problems. We've learned from experience that the advice of Lincoln engineers is sound. We've been skeptical in the past, but we've found the Lincoln man is usually right."

THE LINCOLN ELECTRIC COMPANY

Dept. 1851 • Cleveland 17, Ohio

The World's Largest Manufacturer of Arc Welding Equipment

For More Information Circle No. 62 on Reader Service Card.

NOW YOU CAN GRIND AND FINISH

NEW BAYFLEX DOUBLE-DUTY

Illustrations above show Bayflex Double-Duty in action, held at correct angle for weld bead grinding (top) and for finishing (bottom)

For More Information Circle No. 18 on Reader Service Card.

WITHOUT CHANGING WHEELS!

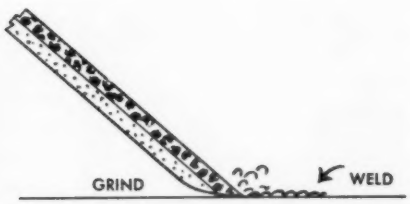
There are two important angles to consider before you buy new weld-grinding or finishing wheels. Bay State's new Bayflex Double-Duty raised hub disc-wheel has them *both!*

The "DD's" unique, two-layer construction gives you two grinding angles: One is 30° - 45° which gives you fast stock removal for grinding weld beads . . . and the other is 10° - 20° which gives you a finish without gouging, a finish so smooth it's just short of a polished surface.

The upper layer for weld grinding comes in a single, standard specification. The lower finishing or blending layer comes in your choice of five different grits (24, 36, 54, 80 and 120) for every type of finishing job from heavy steels through light stainless sheets to aluminum and copper.

Your Bay State representative is ready now to demonstrate the Bayflex Double-Duty in your plant under normal working conditions. Get in touch with him and see what he can do to cut costs and speed up your weld grinding. You'll find he's more than a good salesman . . . because he's an experienced abrasive specialist, too. *Better grinding at lower cost . . . that is his business.*

IS 2 WHEELS IN 1



Upper layer removes stock rapidly when disc is held at 30° - 45° angle.

Lower layer smooths and blends surface when held at 10° - 20° angle.

BAY STATE ABRASIVES

BAY STATE WHEELS of PROGRESS

Bay State Abrasive Products Co., Westboro, Mass.
In Canada: Bay State Abrasive Products Co., (Canada) Ltd., Brantford, Ontario.
Branch Offices: Bristol, Conn., Chicago, Cleveland, Detroit, Pittsburgh, Los Angeles.
Distributors: All principal cities

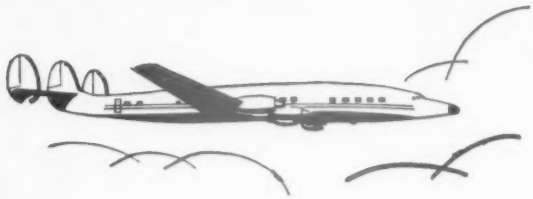
For More Information Circle No. 18 on Reader Service Card.

B-1 Flux is particularly effective in removing refractory oxides such as those formed in stainless steels.

Operator fits preformed ring of BRAZE 541 prior to fluxing. This is a hose and tube assembly for an oil line.

Here operator applies gas-air torch, hand-feeding BRAZE 541 to joint.

Oil-bearing unit under induction heating.



Here's How Stainless Steel Fuel Systems Benefit From

HANDY & HARMAN SILVER BRAZING

Tube Processing Corporation, Indianapolis, Indiana, makes aircraft and missile fuel systems and, if anything has to be more failure-proof than a fuel line assembly in an airplane, you name it. The units shown here are made of 410 stainless steel tube and 321 stainless steel fittings; when they're joined, they must be joined permanently. Exhaustive tests, including X-ray, pass on each assembly before final acceptance.

Operator placing oil line (of another type) in induction heating ring.

To meet all requirements: strength, ductility, liquid and airtightness, production speed and economy, Tube Processing uses Handy & Harman's special alloy BRAZE 541 (formerly Alloy 4772) and HANDY B-1 FLUX.

Developed strictly for brazing stainless, BRAZE 541 is one of many Handy & Harman brazing alloys—both standard and special—made to do a specific job and do it better than any other metal-joining method.

Name your product and the metals it's made of, the chances are very good indeed that one of Handy & Harman's silver brazing alloys can join it better than the method you now employ. Better from every aspect: economy, speed, strength, conductivity, labor savings. Put your product in these pictures for the same benefits.

An exclusive additional benefit is Handy & Harman's application Engineering Service. This is a service that exists to show you how these benefits can best be applied to your product. We invite you to take advantage of both Handy & Harman Brazing Alloys and Engineering Service.

GET THE FACTS

Technical Bulletins T-1 and T-2 give the general characteristics of silver brazing alloys plus the compositions, melt and flow points of 32 separate alloys. Write for your copies.

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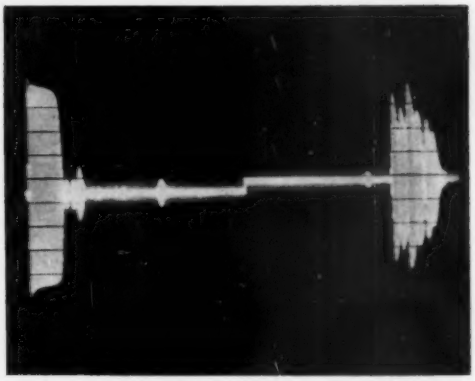
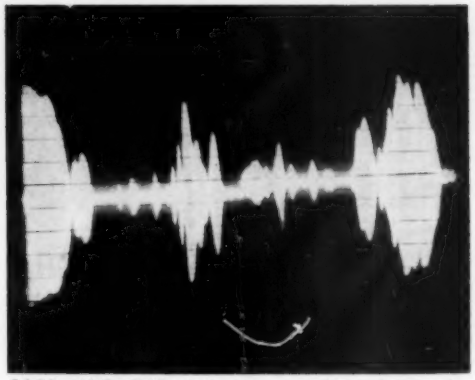
For More Information Circle No. 47 on Reader Service Card.

THE FEW SECONDS IT takes to edge check a plate is the secret that makes ultrasonic testing economical; more time-consuming top checking is done on the 10 percent that don't pass.





GOOD AND BAD indications resulting from edge checking. Top pattern is acceptable, scrambled pattern (bottom) may prove to be lamination.

Is Laminated Steel Your Problem?

by **JOHN M. ST. JOHN**, *metallurgical staff engineer, Caterpillar Tractor Co., Peoria, Ill.*

IN BRIEF: Here's how Caterpillar uses ultrasonic testing to prevent laminated steel plate from turning up in almost finished weldments.

LAMINATIONS in structural steel plate have been a trouble spot for years. Though not common, laminations (thin, planar defects) are often found at an advanced stage in processing, usually when heats can no longer be identified. They show up in welding or machining and often result in scrapping the whole fabrication. One piece of laminated steel plate can result in the loss of an expensive assembly. This loss amounts to 20 to 50 times the value of the original plate.

A happy solution to this problem was the development of an inexpensive ultrasonic technique for checking laminations. The technique involves two steps: "edge" checking, to find questionable plates, and "top" checking of those failing edge check requirements. Top checking of the questionable portion of a shipment definitely determines the presence of rejectable laminations and outlines their extent.

As-received stacks of plate are edge checked (see photo). A 1 Mc 45° angle beam is used to find questionable plates. The beam travels across the plate in a zig-zag path bouncing between the top and bottom surfaces. Thus, the lamination will reflect part of the beam and show on the cathode ray tube (screen) as a pip.

Both ends of each plate are edge checked because the lamination is bound to extend to at least one end of the plate. It is also true that many irregularities, such as heavy non-metallic stringers, will give suspicious indications; edge checking alone is not sufficient evidence for rejection.

A mill or flame cut edge is usually a satisfactory surface for edge checking. Sheared edges can be troublesome; it is generally better to grind them before checking. Plate sizes from ¾-inches to over 3-inches thick, and widths up to 35-inches have been successfully edge checked. The amount of plate marked as being suspicious is usually small—less than 10 percent.

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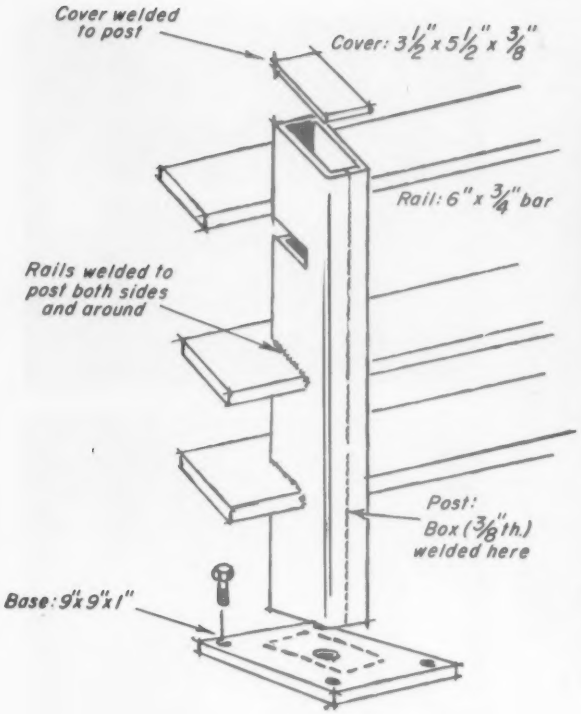

Cover welded to post
Cover: 3½" x 5½" x ⅜"
Rail: 6" x ¾" bar
Rails welded to post both sides and around
Post: Box (⅜" th.) welded here
Base: 9" x 9" x 1"

1 Press operator and helper punch slots in post blank on a 240-ton press.

Highway Guard Rails Are Designed For Welded Fabrication

IN BRIEF: Proper welded design and good fabricating and welding techniques combine to make a low cost, high quality product.

THE ORNAMENTAL RAILINGS you see along the New Jersey Garden State Parkway are fabricated and welded at the Elizabeth Iron Works, Union, N. J.

To be low bidder, Elizabeth knew that it was going to have to figure out an exceptionally thrifty design. It would have to use fast and powerful shears and brakes as well as welding and flame-cutting. From the architects sketch, the Elizabeth engineers planned a fine, modern, steel railing.

You can see how simple it is by looking at the exploded view. There are only four parts, all mild steel. But this is the kind of simplicity you find only when the designing is done with fabrication in mind. You can't get it by designing first and figuring out later how you'll make it.

Fabrication goes this way, at Elizabeth.

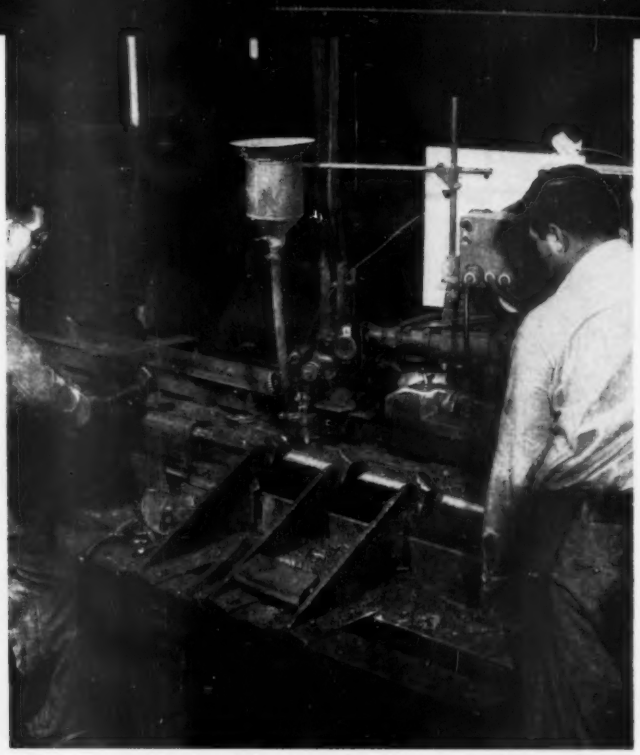
1. *Post* starts life as a rectangular blank of ⅜" stock. Then the pattern for the post's sloping top is flame-cut out of a whole stack of blanks at once. It's done automatically with four torches at a time. Next two men, working at a 240-ton press, punch three slots in every blank. Last, three men at a 350-ton long-bed press brake make all bends that change a shaped blank into a box-section post.

2. *Cover plate* of ⅜" stock is cut to size on a ¾" shear.

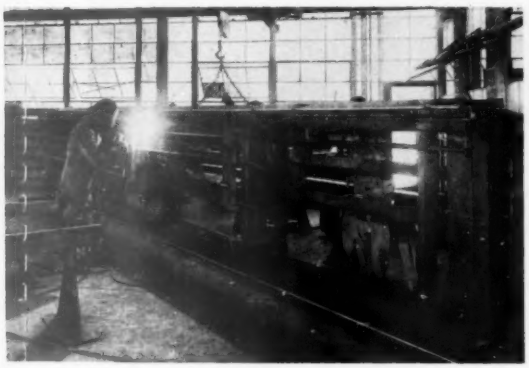
3. *Base* is flame-cut of 1" stock. Then four corner holes are drilled and countersunk. A fifth at the center of the base helps later on in lining up the base and post on the assembly fit-up jig.

4. *Railing* is ¾x 6" bar, comes in mill lengths. Each assembly takes three rails. They are

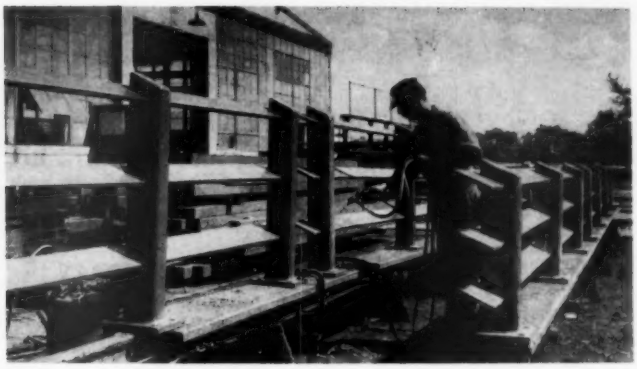
2 A 250-ton press brake is used to form post box section.



3 Operator welds butt joint in post. Wedge-type fixture is fast, accurate and easy-to-use.



4 Operators fit-up and tack rails to posts. Base and cover plate have been tacked to the post.



5 Spray gun gives railing a final coat of primer and enamel paint after spatter has been removed and welds ground and finished.

flame-cut to length.

Automatic welding: Elizabeth welds the post's butt joint with a special submerged arc fixture. It is a long standard I-beam supported in the center so that section can be put in each end. The post seam rests on a copper back-up, is brought together with wedges. This job takes two men. As the operator welds, the helper sets up an removes. They use 400 to 450 amperes, 28 to 30 volts electrode positive, and travel 36 inches a minute. Flux: granular. Electrode: 3/16″ mild steel.

Fit-up: The welders tack and weld the base and cover plate to the post. Then the subassembly goes to the rail fit-up area. Here they load the post subassemblies and 3-rails to the fit-up jig. Lock, secure tight and tack rails to each post.

Welding: After the rails are tacked, the assembly is picked up by an overhead mono-rail and taken to the welding station. The welding station is simple, a fixture, made of four track rails stands 2½ feet above the floor. The fixture's width is 15 feet, length 30 feet. It can accommodate 3 or 4 assemblies at once. An assembly is rested on the fixture. The operator makes all welds on one side. Then he flips the assembly over, rests it on the opposite side, and finishes the welding. All the welds are made with powdered iron electrode.

Final product: The finishers remove spatter, grind and sand spots, and then route for painting. They spray the rails with primer and enamel before shipping. • •

TRACK-MOUNTED CUTTING MACHINE is positioned on tracks parallel to pipe which is mounted on idler rollers.

BENT BAR GAUGE is used to mark off—on alternate lines—slot lengths from drilled holes.

CUTTING SPEED is 15 ipm. Preheat time is six seconds.

AS-BURNED slotted pipe is shown without cleaning.

Skip Burning Controls Distortion

by **CLEMENT F. BROWN**, *production and methods engineer,*
Downington Iron Works, Inc., Division of Pressed Steel Tank Co.

IN BRIEF: Larger filter pipe is slotted in job-shop operation by controlled flame cutting. Distortion is practically eliminated.

WE CONTROL DISTORTION in flame slotting large filter pipes by using a skip burning sequence to distribute heat input to the work piece. We also use pre-drilled starting holes to reduce preheating time.

The 16-inch diameter pipe is 15-feet 8-inches long and has a ½-inch wall. Slots (a total of 704) cut in the pipe's wall are ⅛-inch wide and 6-inches long. Sixteen rows of slots (spaced 22½° circumferentially and on an 8-inch pitch longitudinally) make up the basic pattern. A second set of slots is spaced intermediately between those of the initial pattern.

Before flame cutting, 32 equally-spaced lines are laid out lengthwise on the pipe. Slot-starting points are located and centerpunch holes made. Then ⅛-inch diameter holes are made with an electric hand drill. These holes reduce preheating time about 50 percent and result in cleaner starting points.

Burning is done with a track-mounted tractor-type machine with two torches set at a 22½° included angle. Pipe is positioned on idler rollers for easy rotation. Actual cutting time is 15 seconds per slot.

Here's the way skip burning is done: First, cut a set of slots (in pairs) down the pipe's length. Then rotate the pipe 180° for the second set of cuts. Third line of cuts is made at 90° to the second. Continue this sequence, completing all slots in the initial pattern (4th, 6th and 8th cuts made at 180° to 3rd, 5th and 7th). Then, repeat the sequence for all intermediate rows of slots.

How successful were our distortion control measures? Upon completion and cooling, pipe showed a measured bow of only 1/32-inch down its length. • •

Lincoln

WELDYNAMICS

NEWS ABOUT ARC WELDING AT WORK CUTTING COSTS

A "Squirt" Welder welds heavy plate in 1/4 the time.

WAR AGAINST HIGH COSTS NETS BARGE BUILDER 75% BONUS

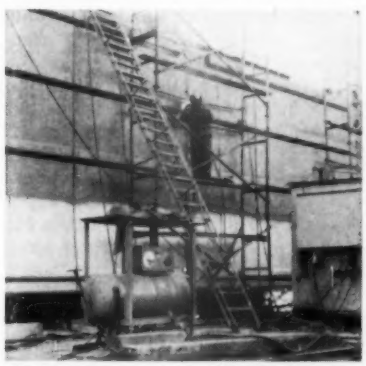
The Wiley Manufacturing Company of Fort Deposit, Maryland, builder of welded barges and large custom built cranes, initiated a cost reduction program that resulted in real savings.

Stanley Welsh, general superintendent, and J. J. Evans, general foreman, faced with ever rising labor costs, decided bold action was necessary if the company was to keep prices competitive. Since welding is the largest single operation in the Wiley yards it was only logical that they should look for a way to reduce welding costs first.

Enlisting the aid of Joe Gulley, a Lincoln welding engineer out of Lincoln's Baltimore office, the Wiley men began a detailed survey of their welding procedures and processes.

Mr. Gulley assisted Mr. Evans and his weldors to analyze the methods and electrodes used for welding sub-assemblies and for joining the sub-assemblies to the main structure. It was found that by positioning the smaller units iron-powder Jetweld electrodes could be used and speed increased considerably.

The jack-pot, though, was won by switching to semi-automatic for welding of heavy plate. By using a Lincoln "Squirt" welder propelled on a gas cutting buggy, Wiley is able to weld heavy plate, up to ¾ inch, in ¼ the arc time previously required to weld it manually.



Welded units form the barge on the ways.

Structural members are fabricated on the ground with Jetweld, then welded into sub-assemblies.

Jack Evans, General Foreman at Wiley, sparked a cost reduction program that succeeded.

Mr. Evans states that these savings are made even greater because very little plate preparation is necessary. Bevel is eliminated in plate up to ½" and weld cleaning is greatly simplified. The resulting welds are better, too, than can be made manually.

The result—a 75% saving in arc time on this operation!

Although no overall cost figures were immediately available, Mr. Evans estimated that they had been able to reduce total welding costs by at least one third.

The LINCOLN ELECTRIC CO.

Dept. 1852, Cleveland 17, Ohio
The World's Largest Manufacturer
of Arc Welding Equipment

For More Information Circle No. 61 on Reader Service Card.

Adam's apple

Adam loved apples . . . so when my wife Goldie brought in a tray full of her homemade apple candies he scooped one off the tray and flipped it into his mouth. Ever hear an ice breaker crushing through the Arctic ice? Goldie, I guess, put too much sugar in the jelly because it was hard as a rock.

Adam's face turned slightly pink, then apple red, as the jelly apple snapped, crackled and popped. "Boy," he said, "I wish I could get a tough coating like this on cast iron parts."

"Well, Adam," I said laughing, "maybe Goldie can whip up a batch of jelly for you so you can dip your cast irons in it. That'll protect them against practically anything," I roared.

"But will it stand up to corrosives?" he asked trying to laugh.

"I'll tell Goldie to add a little Monel* nickel-copper alloy to the jelly." I chuckled. "You'll make history, Adam."

Then he crushed and crackled, "But seriously, Nick, can you put a Monel overlay on cast irons without it cracking up?"

"Sure thing, Adam . . . and what's more you can get high quality deposits on both unalloyed and alloyed cast irons."

"How?" he crackled.

"By putting down a barrier bead . . . by buttering it up."

"A barrier bead of what?" Adam asked.

"Ni-Rod '55'*, Adam. First you put down a bead of Ni-Rod '55' using A.C. or D.C.R.P. Just one pass will do it. Get a deposit thickness of at least 3/32 of an inch. Then put down your second and third bead of Monel using "140" or "130" Monel* electrode on D.C.R.P. Thickness of the completed weld overlay should be about 5/16th of an inch. Do it that way, and you can kiss trouble goodbye."

Adam took a long, hard swallow and you could see the jelly apple passing by Adam's Adam's apple. He cleared his throat and then said, "What about overlaying large areas, Nick?"

"Well, as a general rule, Adam, stress relieving of the cast iron before overlaying will cut cracking to practically zero."

Just then, Goldie spotted us. She picked up the tray of apple candy and said to Adam, "Won't you have a piece of my delicious apple candy, Adam?"

He gave me sort of a dirty look as he picked up a piece . . . as if I planned it that way or something.

Then Goldie turned to me and asked, "What about you, Nick? Take this nice big piece."

My jaw still isn't what it used to be. As for Adam, no more apple candy for him . . . the apple of his eye is overlaying cast irons with "140" or "130" Monel Electrodes . . . it's much safer.

You can do it, too. Just follow the procedure I told Adam. Write for "Repair Cast Irons Quickly and Easily" to find out other equally "snappy" and important uses for versatile Ni-Rod "55".

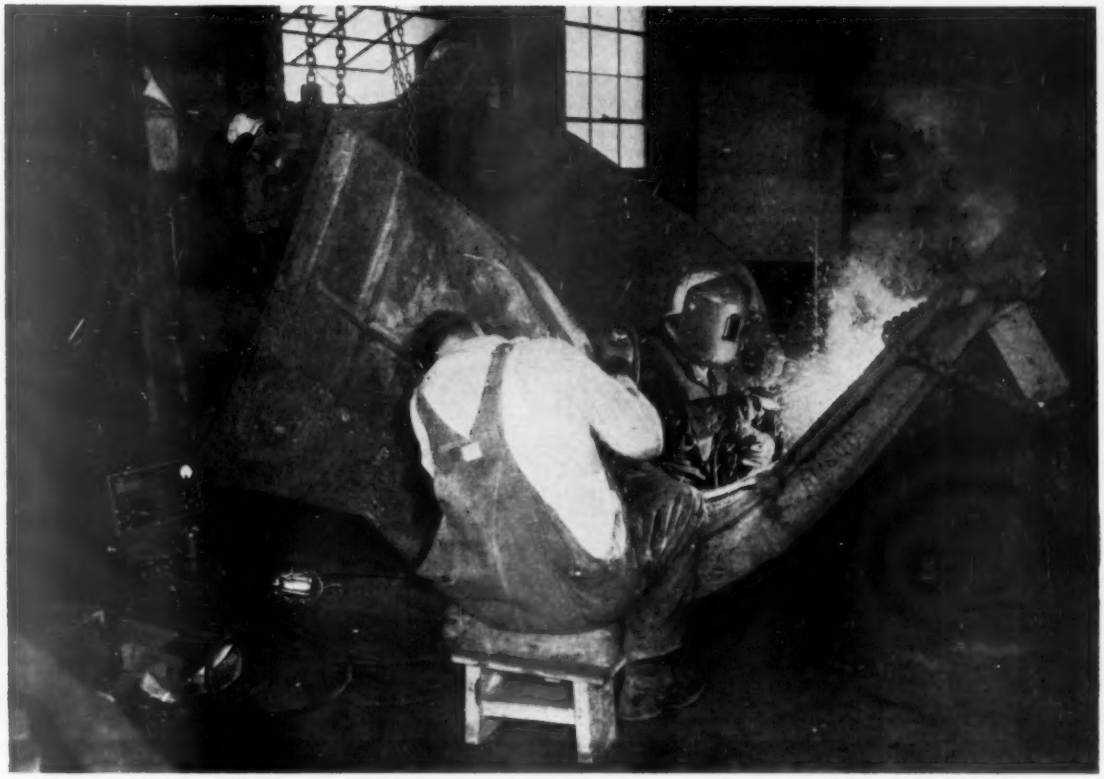
Sincerely,

Nick Rodder

THE INTERNATIONAL NICKEL COMPANY, INC.
67 Wall Street — New York 5, N. Y.

*Registered trademark

For More Information Circle No. 54 on Reader Service Card.



Deposit Hard Facing Three Times Faster With A Semiautomatic

IN BRIEF: Semiautomatic open arc hard facing cuts labor costs in half and salvages an $8000 shovel bucket.

BREAKING THROUGH ROCK is no easy job. The Harry Miller Excavating Company of Suffield, Ohio (near Canton) found that out recently. The firm had the job of blasting and moving tons of rock for a highway.

Without their 80D dipper stick shovel it would have been impossible to move all that rock. The 80D bucket gulps 2½ yards of rock in one bite. And it must withstand terrific battering and abrasion.

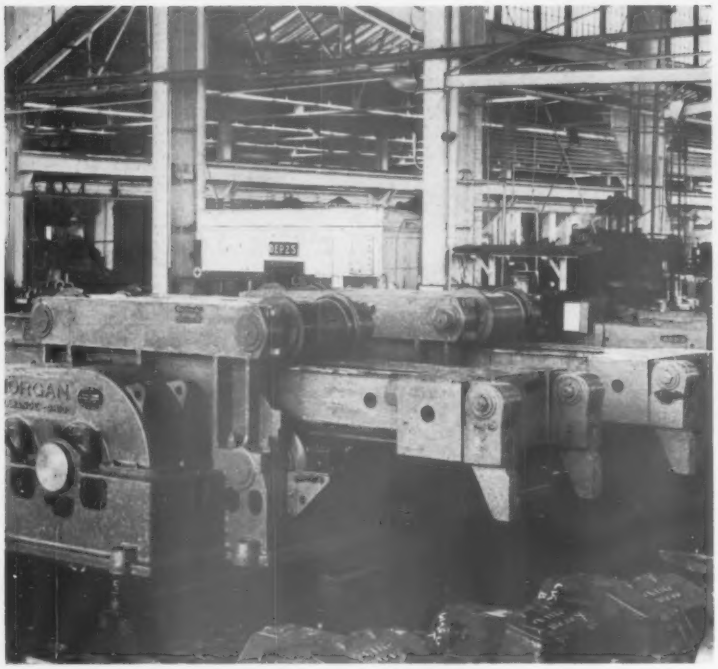
George Burtscher, maintenance superintendent, said the bucket costs about $8000 and needs repair after every job. Miller makes every effort to salvage it. When a job is finished the shovel is returned to the Suffield yard for repair. Burtscher then determines what has to be done to the dipper shovel and bucket.

Costs are kept down by repairing fractures and building up the surface areas of the bucket with hardfacing materials. Until recently manual hard-facing electrodes had been used. Now

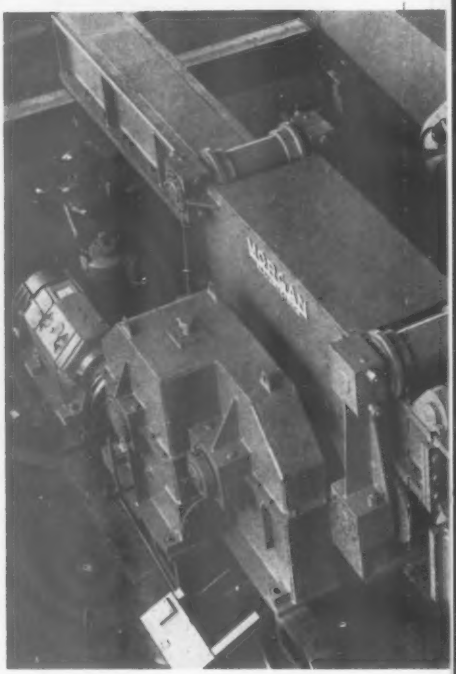
continued on page 96

HIGH NICKEL-MANGANESE electrode is used to hard face bottom of worn shovel bucket.

Weldments cost less, are ready sooner, are changed



CAST COMPONENTS formerly used had poor delivery, were thick and heavy, cost a lot to machine, and could always contain hidden defects.



THE WELDED DESIGN sharply reduced machining time and delivery delays; it let the

Redesign For Welding Speeds

IN BRIEF: Pattern storage and maintenance are no problem now that Morgan has switched to stronger and more versatile welding on slab pusher fabrication.

THE MORGAN ENGINEERING CO., Alliance, Ohio, is building muscle into steel mill slab pushers with strong, welded steel plate. Good thing too; these machines must push 180-ton loads through an 80-foot-long furnace to feed the hot mill. Slabs are 3″ to 6″ thick, big enough to charge the slab-reheating furnace. There they are heated to 2250°F for rolling.

These pushers are the first Morgan ever made from weldments. Earlier models had cast components — slow in delivery, extra-thick and heavy, and always the chance of hidden defects in highly stressed areas. And castings took a lot of machining.

The welded design ended shipping delays, sharply reduced machining time, and used thick sections only where really needed. Add them! You've got some real savings, in addition to a better product.

Another flexibility: Hardenable steels can be

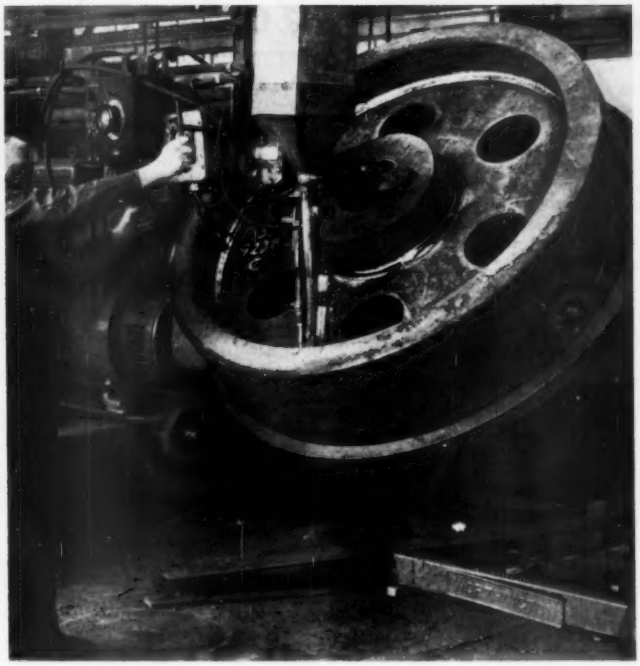
The machine is a double pusher, which means it has two 28-foot long rams that can operate either together or separately. Each has a 12-foot stroke and is hinged on the end to keep from dragging slabs out of the furnace on the return stroke. Rams are powered by 100 hp motors through gear trains, racks and pinions. The last reduction gear in the train is a welding engineer's dream. It takes flame cutting and hardening, automatic and semi-automatic submerged arc welding, manual arc welding, and carbon arc compressed air gouging to make it.

The gear is 54″ across. Its tire (gear blank) is a roll-formed billet of SAE 1040 steel, 3¾″ thick and 12″ wide. The web is flame cut (including holes for hub and lightening) from 1½″-thick SAE 1020 plate. The hub is machined to 12½″ diameter from a whopping SAE 1020 billet.

The first step after rolling the gear tire to diameter is to butt-weld the ends. This is done

easier than the castings they replace . . .

designer put strength where it was needed and make design changes quickly and easily.



BIG PUSHER GEAR on variable speed positioner has web holes that relieve welding stresses and prevent cracks.

Fabrication of 180-Ton Slab Pusher

with multipass submerged arc in a flame-beveled groove. The weld deposits matched base-metal properties. When the outside weld is done, the root is deseamed and welded.

The fitter assembles and tacks gear components, then clamps the job to a variable-speed positioner which tilts for valley welding. Welding head, wire feed and flux hopper are mounted on a manipulator. The welding nozzle is zeroed on the welding joint and kept there during welding with the aid of spot light in front. Web fillets (¾″) are made with 5/32″ wire and a standard granulated flux; current is 650 to 700 amps, travel speed, 8 ipm.

There's a double purpose for the holes in the web. Sure, they lighten the gear, but the reason, they prevent cracks. The holes act as expansion joints to relieve heavy welding stresses.

With the completion of the big fillets, stiffeners are tacked and welded. There are six to a side to prevent deflection in the finished gear. welded to low carbon grades to spot high-hardness in some areas, toughness in others.

Low hydrogen E7016 electrodes are used while the gear is still on the positioner.

Stress relief, with slow cooling in the furnace, follows. Then teeth are machined and flame hardened in a machine that accurately controls the degree and depth of hardness. With the gear laid on a turntable, an ascending multi-flame tip heats gear teeth surfaces red hot. Water jets, immediately below the flames, quench the hot surface to high hardness. This layer (about ⅛″ deep) resists wear, is cushioned with tough sub-surface metal.

Pusher rams are weldments too. These box-like weldments have plate thicknesses on top—2″, bottom—2¾″ sides—1¼″ Boom assemblies are tacked, then positioned for welding. The welding head is mounted on a self-propelled manipulator (track mounted). It travels down the joints depositing a ¾″ fillet.

With patterns out the window and weldments in, Morgan can make production changes associated with any new product, almost as fast as they leave the drawing board. • •

MESSAGE #6 *This message is for men who are vitally concerned with such welding problems as maintaining a smooth flow of production... preventing excessive rejects... and insuring trouble-free, economical, profitable operation*

Welding Wire: Cost-saving and Profit Factors

Production men who are conscious of *both cost and quality* agree that a top-grade weld demands the *right* welding wire. *Only* by using wire with an analysis suited to the material to be welded can consistently sound welds—free from porosity and internal cracks—be produced. Use of the right wire means fewer rejects, less waste, lower costs—plus a better finished part or product.

Experienced welding men have long found PAGE a most reliable source of welding wire for all their regular and special needs. The wide range of PAGE analyses—33 of them—makes it possible to select the exact wire that produces the kind of welds that lower production costs and increase profits.

PAGE experience, talents and facilities are available to you at all times. We have been exclusive wiremaking specialists for more than half a century, and are in an ideal position to furnish our customers with the right wire for each specific need. Furthermore, we have developed a broad packaging program which saves time and money by supplying wire packaged to meet any requirement.

These factors, plus PAGE'S nationwide set-up of conveniently-located distributors, backed up by PAGE warehouse stocks, help make it profitable for you to standardize on PAGE Welding Wire.

PAGE offers—
33 ANALYSES
...the right analysis for your welding job

There are *33 different analyses* in the PAGE line, covering the broadest range of applications: submerged arc...inert gas...tungsten or metal arc...oxy-acetylene gas welding...metal spraying.

For example—ANALYSIS A-S-18

The new Analysis A-S-18 welding wire was specially developed for CO_2 welding of .25 to .50 carbon steel—also for welding of free-machining, sulphur-bearing steels of the AISI-1100 series. These grades of steel have never before been satisfactorily welded by inert gas or submerged arc methods. They can be welded now as easily as low carbon steels.

As evidence of its superiority, note these physicals attained with A-S-18 on .35 carbon steel joints using CO_2 inert gas:

Tensile Strength—75/81,000 p.s.i.
Yield Strength—55/61,000 p.s.i.
Elongation—24%

Equal results are obtainable using a submerged arc procedure with a neutral flux. And, even higher tensiles can be expected on higher carbon steels!

The other outstanding use for A-S-18 welding wire is in welding free-machining or sulphur-bearing steels of the AISI-1100 series. Previously, this has been a difficult, in fact, an almost impossible job. With A-S-18 the sulphur is "boiled out" by the deoxidizers in the wire; the result is a non-porous, high quality weld.

Welding men who are anxious to increase the quality of their work with these difficult grades of steel will want to test this remarkable A-S-18 welding wire under their own working conditions. They will be happily surprised at the results!

For example—ANALYSIS A-S-25

Formerly known as A-S-20-G, Analysis A-S-25 is a modification of A-S-20 where the deoxidizing agents are increased to provide scavenging of all metallic oxides and other impurities, giving (with CO_2) particularly good welds in low-carbon (AISI-1006 to 1022) steel plates. Owing to the higher alloy content, it costs a little more than A-S-20, but for inert gas welding it is well worth it, as it eliminates porosity and underbead cracking.

Analysis A-S-25 is recommended for all miscellaneous CO_2 welding on mill steel work. It will give a tensile strength of approximately 75,000 p.s.i. with an elongation of 26%.

NOTE: previous advertisements in this publication have included brief descriptions of PAGE Analyses A-S-8620, A-S-6150, A-S-30, A-S-NAX-9115, A-S-65, A-S-Armco Iron, A-S-6, A-S-17, A-S-10, A-S-15 and A-S-16. Detailed information on all 33 PAGE analyses is contained in our Welding Comparison Chart DH-1218.

Write for—Welding Wire **Comparison Chart DH-1218**....This new, highly informative, four-page chart lists detailed analyses of PAGE automatic welding wires, metal spray wires, bare electrodes and gas welding rods. Also shows uses and physical properties, including: tensile strength, elongation, Rockwell hardness. Chart lists virtually all competitive makes.

Write for—Submerged arc and inert gas welding wire **Folder DH-402A**...also gas welding rod **Booklet DH-1277.**

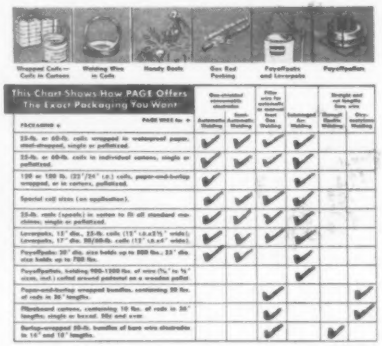
PAGE offers—
Packaging to meet your needs

PAGE Welding Wires are packaged in a wide variety of ways—for the most complete protection and the utmost convenience in handling, in stocking and in use. Here are some major types of PAGE packaging:

1. **Paper-wrapped Coils**
2. **Coils in Cartons, Palletized**
3. **Bare Coils (packed in Leverpaks)**
4. **Masonite Reels**
5. **Payoffpaks**
6. **Payoffpallets**
7. **Gas Rods in Burlap-wrapped Bundles**
8. **Stainless Gas Rods in 10-lb. Tubes**

For example—

PAYOFFPAKS...Up to 700 lbs. of wire, without a single weld...coiled around a fiberboard cylinder within a fiberboard drum...ready to be smoothly unreeled to the welding head for automatic or semi-automatic welding! Eliminates costly machine down-time for coil replacement. Payoffpaks come in three sizes: 20" diameter (holds 250 or 500 lbs.); 23" diameter (holds up to 700 lbs.).



Write for—**PAGE Welding Wire Packaging Chart.** • This useful chart shows the many kinds of packaging of PAGE Welding Wires for each type of welding.

PAGE offers—
Availability from local stocks

Here is a handy service that not only gets you the welding wire you need when you need it, but saves you money by making it unnecessary for you to tie up a sizeable investment in wire inventory.

You can get the exact PAGE automatic welding wire and welding rods your job requires direct from your nearby PAGE Distributor. Located at many points from coast to coast, PAGE distributors carry sizeable stocks for your convenience—and they are backed up by PAGE Warehouses at the strategic locations shown below. Close cooperation between PAGE distributors, PAGE warehouses and the PAGE mill is your guarantee of prompt, intelligent, individual service on your specific needs.

ACCO

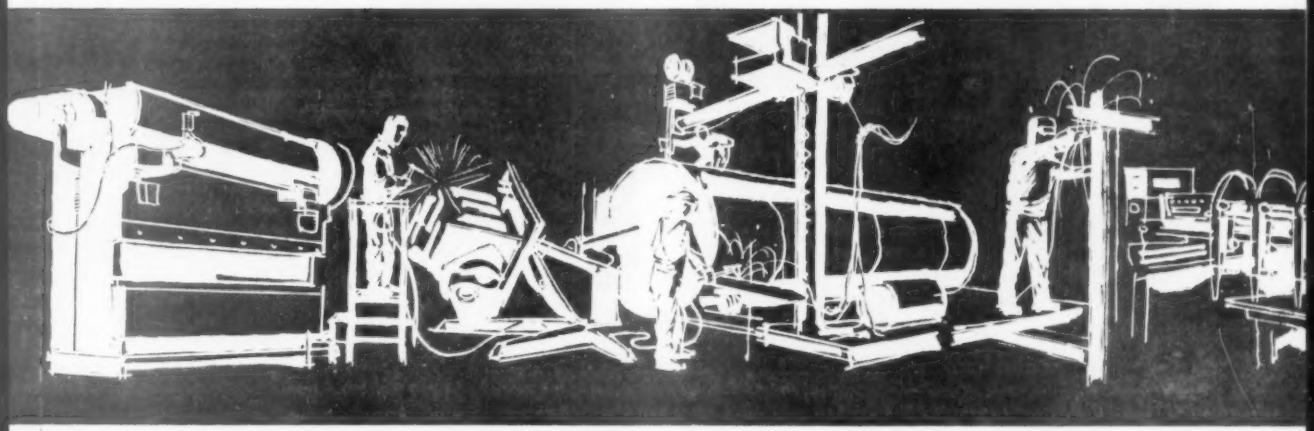
Page Steel and Wire Division
AMERICAN CHAIN & CABLE

Monessen, Pa.*, Atlanta, Chicago*, Denver*, Detroit, Houston*
Los Angeles*, New York, Philadelphia*, Portland, Ore.
San Francisco*, Bridgeport, Conn.
**Indicates PAGE warehouse stocks*

ACCO for Better Values

For More Information Circle No. 82 on Reader Service Card.

IS YOUR PLANT COST CONSCIOUS?



Cost conscious welding management is teaming up with welding equipment manufacturers to get equipment and techniques that will do its jobs faster and better. On the next 10 pages you will find 18 cost cutting ideas resulting from this cooperation...

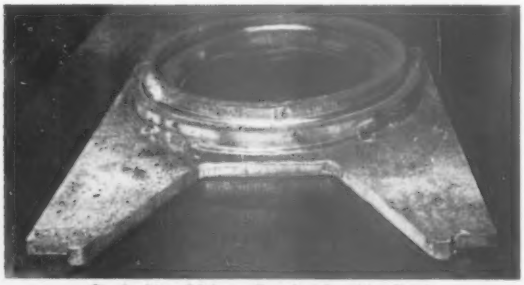
COST CUTTING FOR 1959:

Mechanized hard facing boosts production 300%

MECHANIZED HARD FACING has increased production by four times on diesel engine valve rocker levers and cross heads. Cummins Engine Co., Inc., Columbus, Indiana, has boosted production to 1000 parts per day by using a standard hard facing machine. Manual surfacing only yielded 250 parts per day.

The hard facing deposit is applied to the under surface of the rocker lever and the upper surface of the cross head. The deposit is finish ground to contour. "Haynes Stellite" alloy No. 1 was used because it gives increased resistance to wear from sliding contacts and impact loads.

Circle No. 233 on Reader Service Card.



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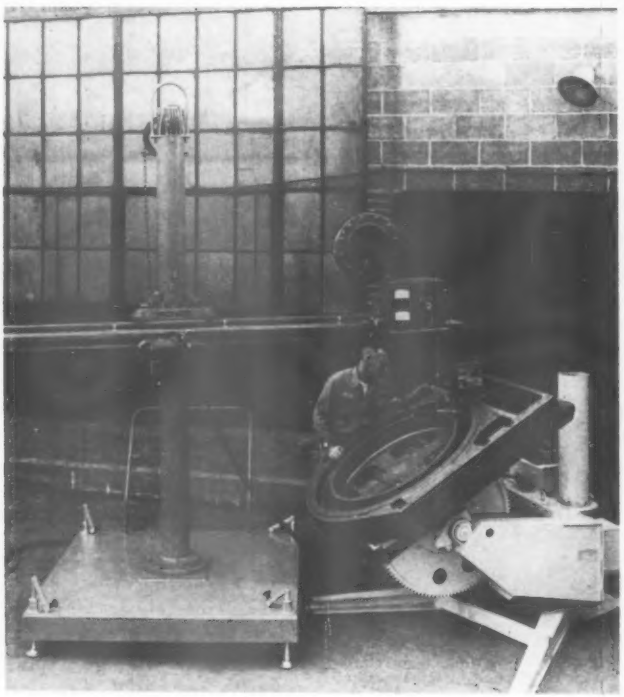
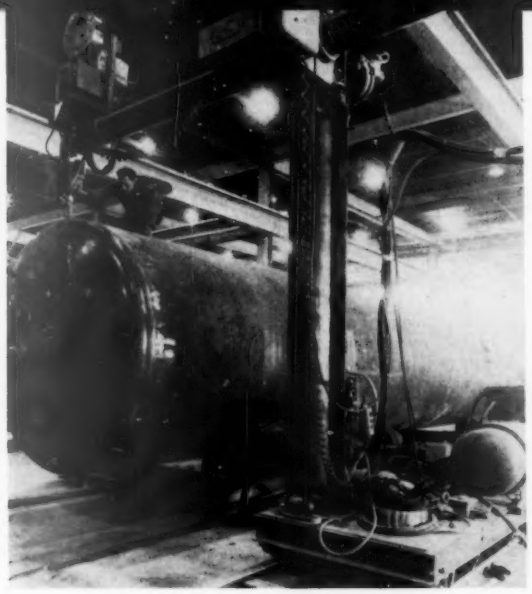
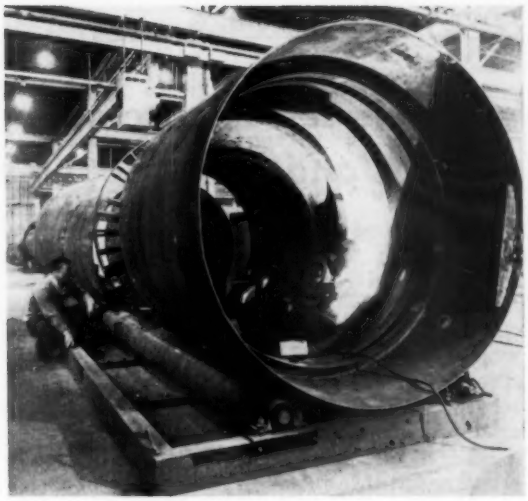


Automatic welding of subassemblies cuts cost 64%

MANY FABRICATED ASSEMBLIES appear to be so complicated by ribs, gussets, short or inaccessible welds that the use of automatic welding seems impossible. However, closer analysis often shows that such weldments can be broken down into subassemblies which are ideal for automatic welding.

The subassembly (top, left) is a part of the welded machine component (bottom, left). When it was prewelded automatically its cost was cut about 64 percent. A similar fabrication and the simple, standard equipment required are shown (above, right). The major equipment required is a manipulator of sufficient range and motions to pilot or position the welding head (in this case, a Lewis "Bantam") and standard work positioning equipment, such as a positioner and/or turning rolls.





Automatic equipment cuts vessel welding costs in half

VESSELS FABRICATED by automatic welding equipment and fit-up and turning rolls are turned out by Cambridge Corporation, a division of Carrier Corporation, at half the cost manual welding would have required.

Before welding, shell segments were aligned and tacked on fit-up rolls (right). Fit-up time was cut at least 50 percent by fitting-up on rolls.

Segments were then put on turning rolls and welded by a manipulator-mounted automatic welding head (left). Company officials feel that turning the vessel under the automatic head is a time saver because predetermined speed of the vessel on the turning rolls, coupled with uniform speed of the welding head, produces a more uniform weld in half the time required by manual welding.

Equipment used by Carrier was engineered by Unique Equipment, Inc.

Circle No. 235 on Reader Service Card.

Carbon arc-compressed air gouging is 75% faster

CARBON ARC-COMPRESSED AIR GOUGING equipment is used by the Construction Supply Co., Celina, Ohio, to make repairs and replace worn parts on earth moving equipment in Northwestern Ohio and Eastern Indiana. "On many jobs the Arcair torch cuts preparation time by 75 percent over any other available work methods," says Construction Supply's Herb Aikman.

One application for the gouging torch is cutting away stainless welds from tractor sprockets (above, left). A flame cutting torch had been used. But, it could not cut stainless and made it necessary to make a cut into the parent metal of the sprocket. This made a larger-than-necessary gap that had to be filled with weld metal—an expensive and time consuming job. Using a gouging torch permits removal of only weld metal.

Removing worn ends from bucket teeth is another application (above, right). When the manganese tips become worn, only the stainless weld metal is removed. The resulting surface is clean and ready to have a new tip welded on.

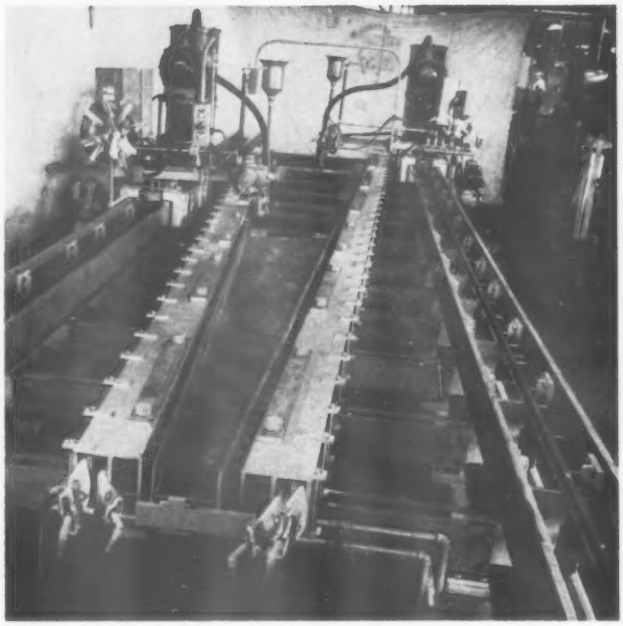
Circle No. 236 on Reader Service Card.

COST CUTTING FOR 1959:

Single set-up assembles, clamps and welds I-beams

THIS EQUIPMENT IS USED to assemble, clamp and automatically weld contours of straight-sided, tapered; single or double, fabricated I-beams. Before the development of this Type IBW machine by The Berkeley Company, weldments were assembled on a layout table with suitable single clamping and tack welded at regular intervals. The beams were then positioned in a cradle for the four longitudinal fillet welds.

Now, in one operation, the flanges and webs are dropped into place on the fixture bed. Air pressure gives a uniform holding pressure for the full length of the weldment. The welding heads are then moved into place and fillet welds made on both edges of the web to the flanges. Companies using this method find welds made from one side produce the required strength.



Circle No. 237 on Reader Service Card.

Nickel-silver alloy brazes tubing faster and better

HOW USING a nickel-silver brazing alloy to fabricate mild steel tubing increased efficiency and cut costs was the subject of a recent editorial feature in INDUSTRY & WELDING. The article explained that earlier use of silver solder had required each of five joints in a bicycle frame to be prepared separately and then soldered. Liquid fluxing was introduced, but would not work with silver solder. Various bronze rods failed to give strong enough joints and contained enough zinc to be troublesome. The solution was a switch to All-State's No. 11 nickel-silver brazing rod. Men on the job reported some of these other advantages: no need for degreasing, no hardened flux to remove, less cracking and better joint quality.

Two INDUSTRY & WELDING readers saw the article and adapted the techniques described to their own particular needs.

A Canadian manufacturer who was also fabricating mild steel tubing reported: "Welding time down 25%, cleaning time down 75%, rod consumption down 37½%."

A New England manufacturer of lawn and porch furniture reported: "It's the only way we know to meet production cost figures. As compared to arcing with attendant cleaning, it affords a 2/3 saving in labor."

Circle No. 238 on Reader Service Card.

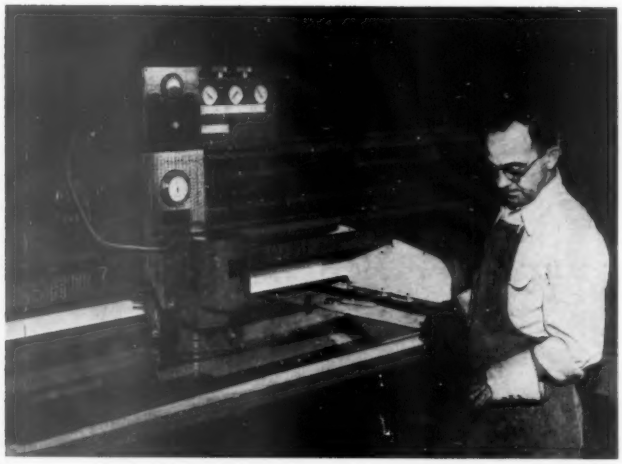
Circle No. 239 on Reader Service Card.

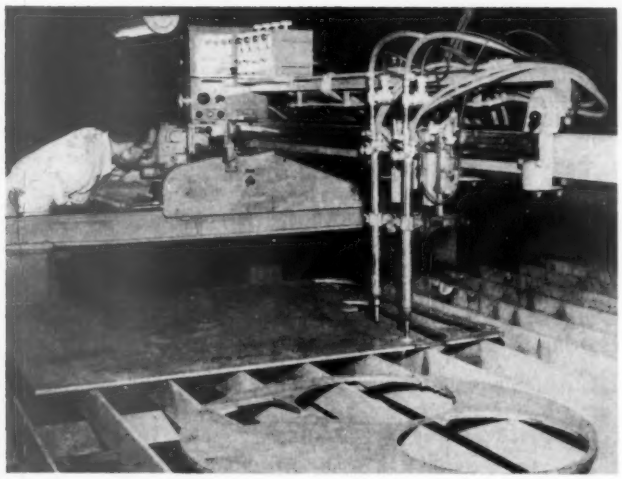
Welded overlays boost service life 500%

ROCK CRUSHER ROLLERS receive harsh abuse from impact and abrasion and are rapidly worn to uselessness unless protected by a tough, welded overlay. Such was the case at an Ohio limestone quarry where rollers had to be rebuilt at high cost at least once a month with the conventional overlay being used. In addition, excessive dilution with the base metal caused by high amperages required called for multi-pass build-ups to offset loss in hardness.

A technical representative from Eutectic Welding Alloys Corp. recommended making an underlayment with EutecTrode 680 AC-DC. This alloy withstands extreme impact and shock and prevents any admixture of the subsequent hard overlay layer of EutecTrode 61 with the base metal. This alloy provides an as-deposited hardness of RC-40 and is highly resistant to abrasive types of wear.

Overlays are now serving four to five months without attention.





Flame cutting makes one-at-a-time parts 67% faster than band sawing

USING EASY-TO-PREPARE paper templates and a flame cutting machine with a photoelectric tracing head makes fast work of small lots. It's one company's answer to the problem of turning out one-of-a-kind special machine tools. To cut irregular shapes, the operator of the unit at Ingersoll Milling Machine Co., Rockford, Illinois, draws the shape on a sheet of paper. He uses full scale plus one-half the diameter of the flame cutting kerf.

A paper cutter cuts the straight edges of the shape. Ordinary paper shears are used to cut radii and contours. Placed on the tracing table of the unit, the sheet can be white paper on a black background or vice versa. The machine's electric-eye tracing head then takes over to follow the outline.

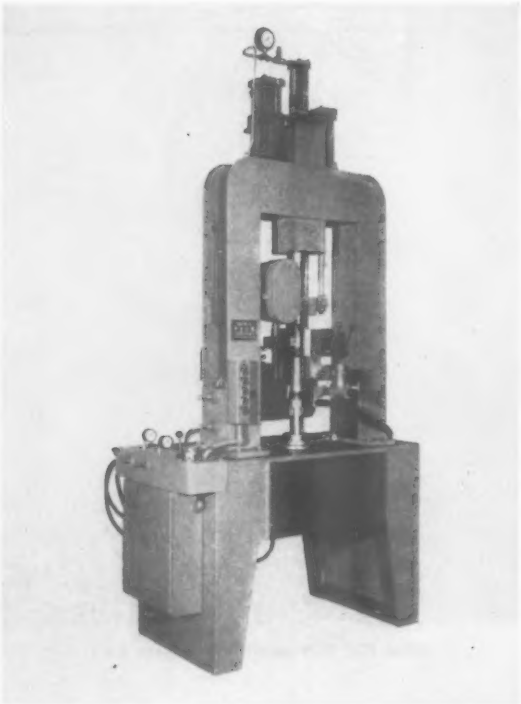
Comparative time studies show greater than two-thirds reduction in cutting out a typical part by the flame method over former band saw machining. Preparing the template takes longer than laying out for a band saw, but this is more than increased by the speed of flame cutting.

The cutting setup is produced by Messer Cutting Machines, Inc.

Circle No. 240 on Reader Service Card.

COST CUTTING FOR 1959:

Automatic welds motor parts faster than riveting



THIS AUTOMATIC MACHINE welds laminations into motor stator cores and pole pieces faster and better than the riveting operation that had been used. It turns our 1500 completed units per 8 hour shift and makes a rigid, solid unit, eliminating loose laminations and rejects.

Stackings used are 26 to 29 gauge and range from 1 11/16-inches to 5-inches in diameter with a maximum height of 6-inches.

The inert gas process is two to make two welds simultaneously and gives 3/32-inch penetration. Two indexing stations are provided. These accommodate different sets of tooling for quick changes.

Although a downward pressure of 10,000 psi may be used, pressures are generally reduced about 50 percent before welding. Most frequently used welding pressure is about 1,000 psi.

Manufacturer is Cecil C. Peck Co.

Circle No. 242 on Reader Service Card.

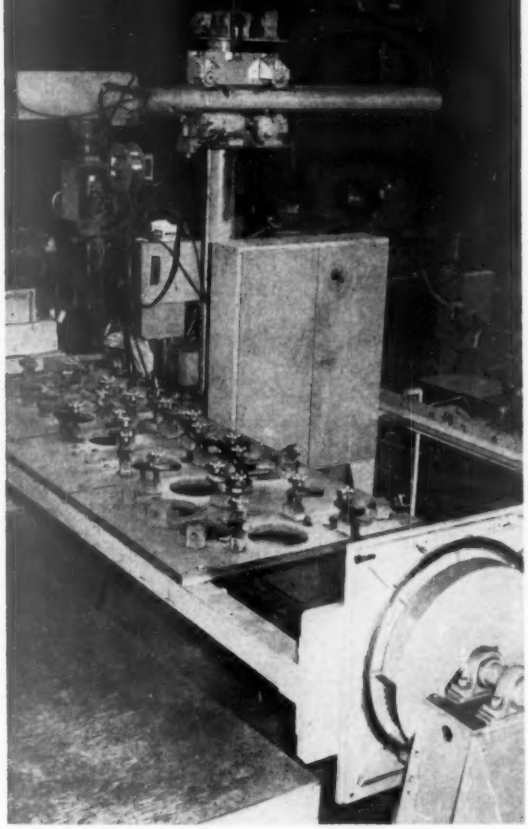
Steel distributor changes gas to lower cutting costs

THE EARLE M. JORGENSEN COMPANY, Los Angeles steel distributor, switched to natural gas for flame cutting and reports that steel plate is cut with less slag and less case hardening. According to Jorgensen, the change from the acetylene gas generator was made to lower fuel and fire insurance costs.

The company used Harris Calorific Company's natural gas torches. It was found that after operators learned the proper adjustments there was little or no increase in preheating time from the old way. Oxygen consumption was kept to a minimum with new Harris regulators. Once the cut is started, preheating gas is materially reduced by means of a lever on this regulator.

Cutting is done at Jorgensen with an eight-torch electronically-controlled pantograph machine marketed by Air Reduction Sales Co.

Circle No. 241 on Reader Service Card.



Circle No. 243 on Reader Service Card.

Circle No. 244 on Reader Service Card.

Semiautomatic equipment speeds tank plant welding

SEMIAUTOMATIC WELDERS are being used more and more with full automatic equipment. The reasons are higher speeds, deeper penetration, improved physical properties and easier clean-up than with other methods.

That's the experience of Cadillac Cleveland Ordnance Plant which makes tanks and weapons carriers. Almost all high strength welded parts are made of 4130 steel. Being used more and more is the Dual Shield process of National Cylinder Gas Division of Chemetron Corp. This process uses an alloyed flux-cored wire and carbon dioxide shielding gas. Welds were formerly made with CO^2 shielding and solid wire.

Suspension arms for light tanks are typical. Cadillac uses a fixture which holds eight arms in an automatic welding setup. The head on a Herrick welding manipulator lowers, rotates the head to make the weld, retracts and indexes the device for the next arm. The operator only loads preheated parts and removes welded parts to a postheating device.

Each arm is made of ¼-inch stamping with two cast bearing housings. Dual shield welds give about 50 percent penetration while depositing a ¼-inch fillet at 25 ipm. Spatter is slight and flux is easily removed.

104 welding arcs from one source saves $5,000

A SINGLE DC POWER SOURCE for 104 welding operators is saving Jersey Central Power and Light Co. more than $5000 per month during construction of their Sayreville Station extension.

Three phase, 4160-v power steps down to 460-v, then feeds three silicon rectifiers. Single-pole disconnect switches connect the rectifier output to main welding bus. Two 1500-mcm risers at either side of the boiler are tapped at four elevations. Cables lead off from these tap points to 6-bank welding stations. Here, operators adjust amperage from 10 to 295 in 5-amp steps.

Rectifiers were chosen for economy. Placing them outside the plant eliminated costly 460-v conduit distribution. Maximum open-circuit voltage indoors is 80-v DC. Small rheostats replaced individual power packs for each art, lowering initial equipment cost.

Big savings, though, come in reduction of manhours. Operators save 30 minutes a day since they can adjust welding head near their work. Labor savings are estimated at 36,000 manhours during first 15 months.

Installing the central system cost $25,000 less than the $74,000 it would have cost for individual welding stations.

COST CUTTING FOR 1959:

Portable hand gun welds thin aluminum faster

CONSUMABLE ELECTRODE welding of aluminum cabinets with Westinghouse Corporation's SA-110 West-ing-arc gun helped save that company's Baltimore Electronics Division over $50,000.

The use of tungsten arc welding would have required expensive tooling to compensate for shrinkage. The gun allowed use of reduced wire diameters and increased the portability and stability of the mechanized process on thin aluminum sections.

Welding speeds were increased up to seven times. Reduced heat input kept distortion to a minimum, simplifying tooling needed to obtain acceptable tolerances. This lower heat input also made it easy to weld joints where the heat of tungsten arc welding would have caused sheet metal to expand away from its mating part.

Circle No. 245 on Reader Service Card.

Dual floating heads weld 130-foot beams faster

DUAL FLOATING WELDING HEADS are the big feature on this welding head manipulator used by a structural steel shop to speed production of fabricated beams. One operator and a helper operate the World Electric Company's "Robot" and turn out ten to twelve 130-foot beams in an 8-hour shift. Only two of these could be produced using manual welding and equal man-hours.

The welding heads float vertically 12-inches and horizontally up to the full length of the boom. This is done mechanically, not electronically. The travelling base is also powered and operates at variable controlled welding speeds for floating head operation, or with single or dual heads in fixed positions.

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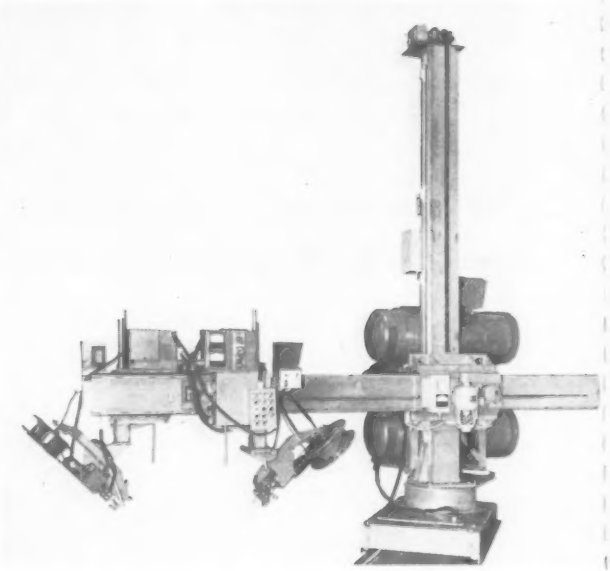


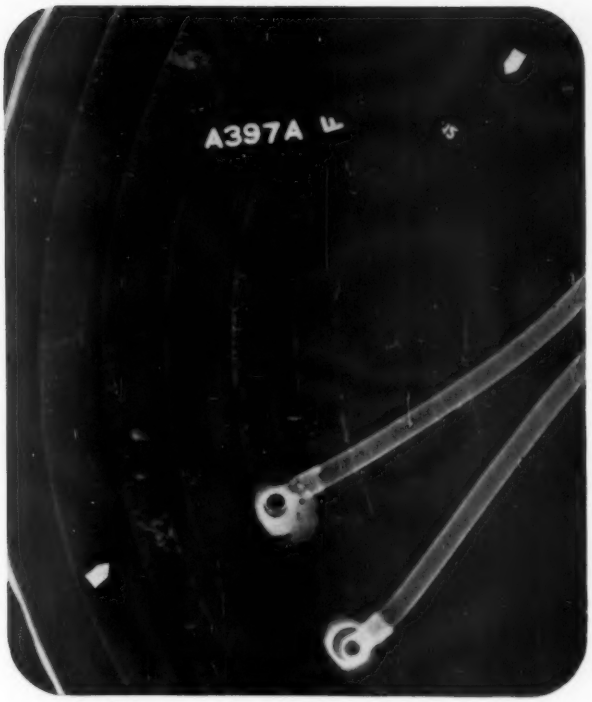
Portable nibblers cut costs 75 percent

PORTABLE NIBBLER used at left to cut 11 gauge stainless truck body is being used more and more by metal fabricators. One such company, Longbons Roofing and Sheet Metal Co., Decatur, Ill., reports: "Nibblers reduce cutting time 50 to 75 percent."

Typical electric and pneumatic nibblers currently available from Fenway Metal Products are lightweight and small, but powerful and versatile. They can be used on 10 gauge stainless, 8 gauge mild steel and 3/16-inch non-ferrous metals. (A new nibbler just introduced can be used on ¼-inch mild steel.)

Circle No. 37 on Reader Service Card.

A Cherry-Burrell milk-cooling tank with heat exchanger welded to the bottom.



Radiograph showing welding had flashed, leaving splattered metal spurs.

The tank had to be "Tops" —*Radiography pointed a way*

Milk handling and storage equipment has the most rigid health and sanitary requirements. The high quality and safety of milk must be protected. So, when this Cherry-Burrell farm milk cooling tank was developed, every precaution was taken to strive for perfection.

For example, the tube heat-exchanger welded on the bottom was radiographed to check for soundness. Early radiographs showed several places where the welding had splattered and formed spurs inside the tubing. This could have caused difficulties. So, the welding technique was altered and later radiographs proved the trouble removed.

Radiography is a great protector of quality. It can assure the welder and the foundryman that only good work leaves his shop. It saves time and money—helps build business. If you would like to know how it can help you, get in touch with your x-ray dealer or Kodak technical representative and talk it over.

X-ray Division . . . EASTMAN KODAK COMPANY . . . Rochester 4, N.Y.

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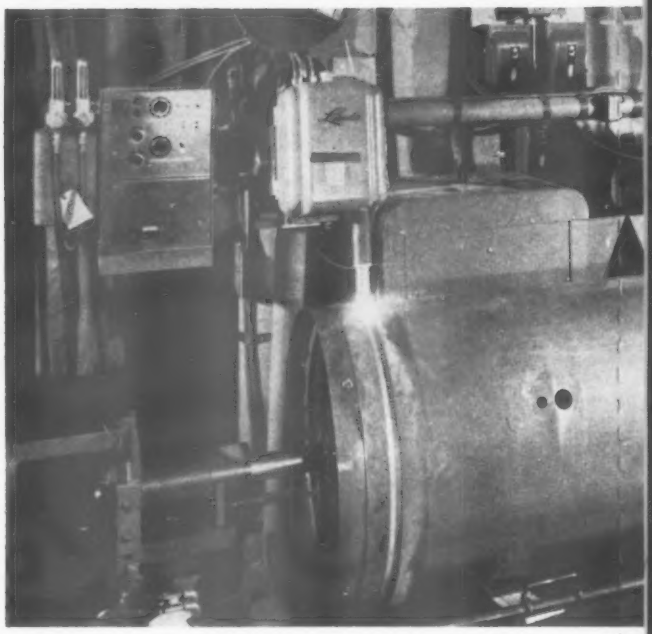
COST CUTTING FOR 1959:

Mechanized equipment cuts welding time 67%



TWENTY-TWO of Linde Company's Sigma and Heli-arc mechanized welding units are spearheading production of 150 aircraft fuel tanks a day at Royal Jet, Inc., Alhambra, California, one of the country's three major aircraft tank manufacturers. The .050- to .125-inch aluminum jetplane wing tanks are joined at speeds of 50 to 110 ipm. Twin Sigma units (right) join stiffener rings to the body of a 230-gallon tank for an F-100 Super Sabre.

The high-quality, 85 ipm welds reduced leaks and cut time to one-third that of previously-used manual welding (28 ipm).

Circle No. 247 on Reader Service Card.

Blast cleaning weldments saves $40,000 a year

AN AIRLESS ABRASIVE blast cleaning machine was installed recently at Towmotor Corporation, Cleveland, Ohio, to replace wire brushing and sanding of weldments. Capable of handling pieces up to 108-inches long and 50-inches high, the Wheelabrator Swing Table now cleans more weldments in a single shift than were cleaned previously in two shifts. Savings on individual weldments range as high as $3.88 each and labor savings of 200 man-hours a week have been registered. Total savings have been estimated at well over $40,000 a year.

According to Factory Manager N. K. Brothers, "Blast cleaning gives us a much better surface for painting because it cleans down to virgin metal." He also points out that cleaning readily shows up sub-standard welds.

Modern materials handling methods are used. Weldments are transported by means of a motorized conveyor. They are lifted from the conveyor by hoist and placed on the work table mounted on the open door of the blast cleaning equipment. The door is closed, cleaning done and the cleaned parts removed from the work table by hoist, put back on the conveyor and sent on for painting.

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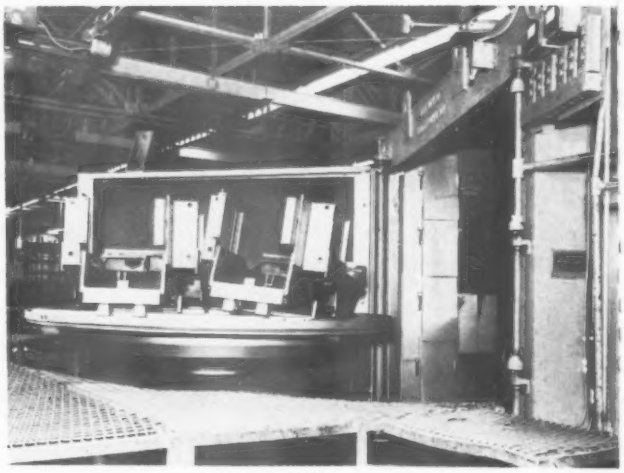
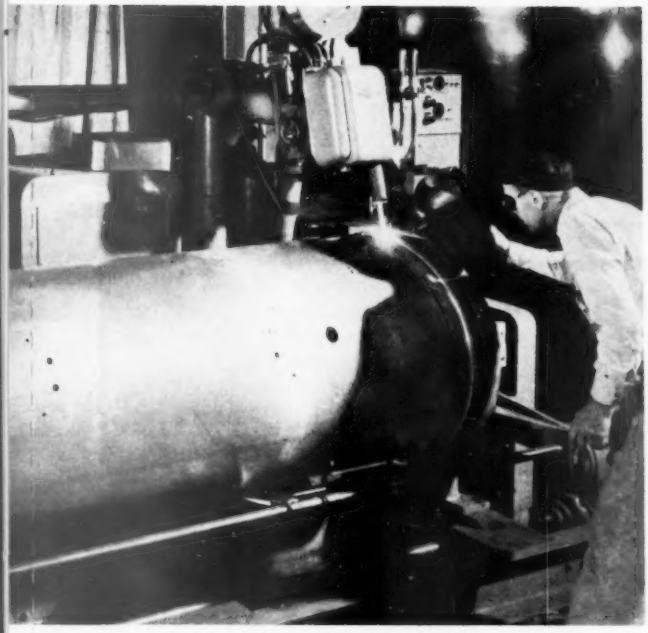




Dry electrodes cut reworks 94%

A CONSTRUCTION MACHINERY PLANT in Milwaukee, Wisconsin, started getting one-in-three welding rejects on a hydraulic fitting. Moist electrodes were causing porosity, underbead cracking and rough welds; many of the electrodes had to be discarded.

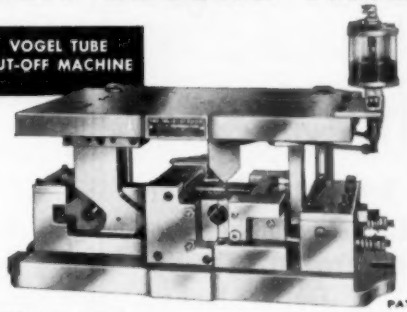
An electrode oven purchased from Phoenix Products Co. was used to store all unpackaged low hydrogen electrode. By preserving the original baked quality of the mineral-coated electrodes, production time was increased and reworks were cut from 28 percent to 1½ percent. Cost of protection was approximately 11 cents for a 24-hour day.

Circle No. 249 on Reader Service Card.

For More Information Circle No. 106 on Reader Service Card.

Cuts Tubing to Accurate Lengths in SPLIT SECOND TIME!

VOGEL TUBE CUT-OFF MACHINE



PATENTED

LENGTHS of ½ inch or more are accurately cut to ± .010" with each stroke of press—actually less than ⅓ of a second or faster than any other known method. In addition to being rapid and precise, the Vogel Cut-Off also cuts clean with a minimum of burr and distortion. Many thousands of cuts can be made before shear blades require sharpening. Unit No. 12 accommodates tubing up to ½" O.D. with 3/32" wall; the No. 2 takes tubing up to 2" O.D. with ⅛" wall.

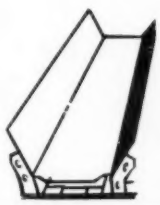
Ask for sample showing how clean-cut your tubing can be sheared with this machine.

VOGEL TOOL AND DIE CORPORATION
1819 North 32nd Avenue, Stone Park, Ill.

Wearalloy

LOW-COST HIGH ABRASION-RESISTANT

CARBON-MANGANESE STEEL



Wearalloy "A" . . . . . .

For High Abrasion-Resistance

HARDNESS: The surface hardness is 200 to 250 Brinell as-rolled.
PUNCHING AND SHEARING: Must be done with care; thickness up to ½-inch should be punched or sheared at temperature not lower than room temperature.
DRILLING AND MACHINING: Standard equipment can be used.
FORMING: Readily hot formed, but cold forming is not recommended.
WELDING: Use low hydrogen electrodes.
APPLICATIONS: Wear plates for drag buckets, conveyors, liners, chutes, hoppers.
STOCK PLATE SIZES: ¼-, ⅜-, ½- and ¾" by 48" by 144".

Wearalloy "B" . . . . . .

HARDNESS: Heat treated to 350-400 Brinell for shock- and wear-resistance.
FORMING: Can be cold formed.
WELDING: Use low hydrogen electrodes.
APPLICATIONS: Ore chutes, quarry dump truck bottom liner plates, rock crusher liners, wear liners, concrete block machines, concrete pipe core liners.
STOCK PLATE SIZES: ¼-, ⅜-, ½-, ⅝-, ¾- and 1" by 48" by 144". **BARS:** ¾" by 4", ¾" by 6", 1" by 5" Mill lengths: 18-20 feet.

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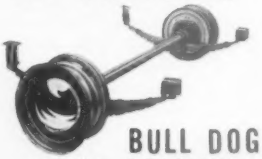
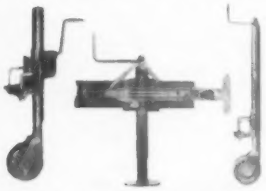


BULL DOG AXLE ASSEMBLIES

BULL DOG JACKS



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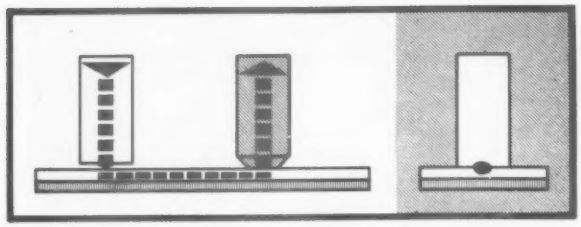
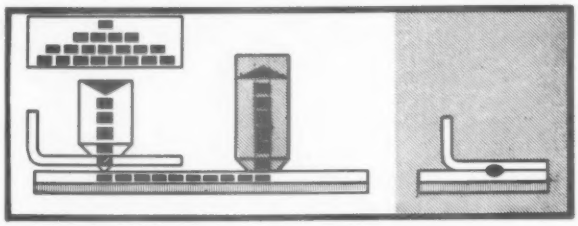
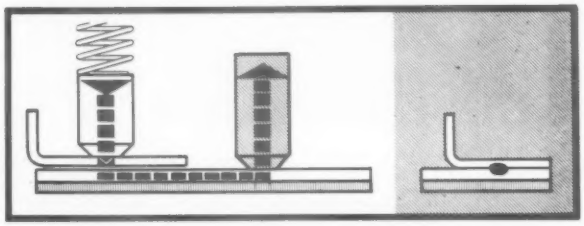


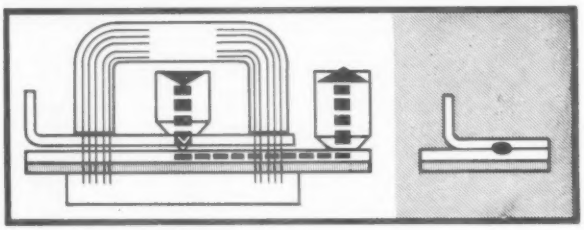
Stored energy stud welding



Projection welding: capacitor discharge



Spring-loaded electrode welding



Magnetic force welding

4 Techniques For Resistance Welding Vinyl Coated Steel Sheet

IN BRIEF: Welding time, energy and pressure must be controlled to make a weld without damaging the vinyl. Current flow must be controlled from the backside because vinyl is an insulator.

PLASTICS AND STEEL SHEET have been successfully combined by U. S. Steel to create a versatile product known as vinyl-coated steel sheet. The new material is said to offer new economies, rugged physical qualities and attractive surface treatment. It has received favorable rating from Underwriters Laboratories.

The plastic-on-steel application involves curing and bonding of liquid vinyl plastisols to sheets and coils—either cold rolled or galvanized in a continuous coating process. Prior to cooling, the coating can be embossed with any texture that can be engraved on a printing roll.

A number of commercial products are already being manufactured with vinyl coated steel. These include portable electric heaters, room coolers, movable steel wall partitions, folding chairs, office tape dispensers and doors.

The four basic techniques for welding vinyl coated steel sheet are shown above. • •

WELDING DISTORTION

Continued from page 36

tered the kink and caused the trunnions to run true again.

On one occasion, a very simple weldment stirred up a lot of trouble until distortion was brought under control. A 16-foot square, 3½-inch thick plate was made by butt welding 4-foot wide and 12-foot wide, 16-foot lengths. A double U groove insured flatness, and transverse weld shrinkage was no problem. The real problem was weld cracking. Cracks always occurred when between one and three passes were deposited, no matter what the welding sequence.

The trouble was traced to the bowing of the 4-foot plate from one-edge (weld) heating. The solution that eliminated the bow (and the weld cracks) was counter heating of the outer edge of the plate at about the same rate as welding. • •

AUTOMATIC WELDING

continued from page 40

First, a portable preheat oven was used to preheat tubes and fittings to 200°F.

Second, a holding fixture was used to support the barrel and end fitting while the fitting was tack welded into place. Two ½-inch welds were used to secure the fitting to a back-up chill ring which was in turn secured to the barrel with two more ½-inch welds.

Third, a rotating, three-jaw chuck was used to clamp the barrel and end fittings under an automatic tungsten arc welder. The machine feeds a 1/16-inch diameter welding wire continuously at 5 to 8 ipm, eliminating the porosities caused by starting and stopping. The machine is also equipped with a floating electrode head, electrically controlled to respond immediately to change in arc voltage. The head raises or lowers automatically whenever the arc is shortened or lengthened—which occurs as the arc passes over the short tack welds, and as the weld seam fills up.

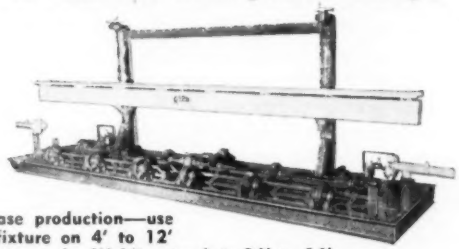
The seam is about ⅝-inch deep; the machine fills it in 22 minutes, without porosity. Fifteen passes are required to complete the weld. The thrust brace is purged with argon gas before welding. Its temperature is not allowed to drop below 200°F during welding.

This technique virtually eliminated porosity and drastically reduced welding time. Work time per thrust brace has dropped from 10 hours to one. The rework required to bring rejects up to standard has dropped from 84 percent to less than one-half of one percent. Overall tolerances and standards were so good that Boeing tore up their own specs and accepted Ryan's as standard. • •

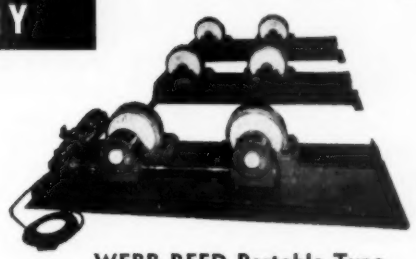
WEBB TANK PRODUCTION MACHINERY

Horn Type Fixtures | Cylinder Flange Offsetters | Assembly Fixtures

WEBB-REED TRACK SUPPORTS
For Automatic Welding Head Carriages



Increase production—use this fixture on 4' to 12' diameter work. Welding track is 24' to 34' long. Powered vertical adjustment is available for all models. May be used with your present turning rolls, welding positioners, special jigs for straight seam work, or portable type rolls illustrated.



WEBB-REED Portable Type TURNING ROLLS

For manual or automatic welding and other operations requiring rotation of a cylindrical vessel. Capacities range from 3 tons to 75 tons; larger units built to special order. Powered by electric motor with variable speed transmission. Readily portable, they may be used free or anchored to the floor as desired.

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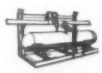

Unit Type Turning Rolls

Portable Turning Rolls

Automatic Welding Track Supports

REED EQUIPMENT DIVISION
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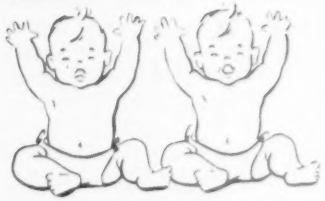
YOU GOTTA KEEP 'EM DRY!



Moisture "messes up" electrodes, too, cuts welding profits.

End costly reworks by drying rods in

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Mineral coated electrodes are *thirsty*. The instant you unpack them they start soaking up moisture . . . within 2 hours often as much as 13 times US allowable specifications. Moist rods cause porosity, under-bead cracking, rough welds, etc. Rod scrap runs high. Production slows down. Reworks eat up profits.

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WELDING MANAGEMENT

• watches these developments

A NEW RADIOISOTOPE SOURCE, Samarium-153, has been developed by General Motors Research laboratory. Material is considered a break-through in the field of low-energy photon sources; it has been used for experiments in both industrial and medical radiography. It should be good for examining thin aluminum and steel parts which can not be radiographed by present sources, such as cobalt and cesium Advantages: excellent panoramic photo energies for making inside-out pictures of certain types of castings; five times shorter exposure period than any other known, low-energy photon source; lightweight container and shield (about 30 lbs.) and low cost. Disadvantage: short half life—about two days.

"PRODUCTION PROGRESS THROUGH RESISTANCE WELDING" is the title of a six-page leaflet on the importance of resistance welding to profit-minded, progress-minded metal fabricators. Release of the leaflet by the Resistance Welding Alloy Association has been scheduled to coincide with the initial celebration of "National Welded Products Month"—in April. Copies are available without charge from the RWAA at 1900 Arch Street, Philadelphia 3, Pa.

STEEL PRODUCTION IN JANUARY, 1959, was 9,312,000 net tons and was the highest for any month since the middle of 1957, according to the American Iron and Steel Institute. According to the Institute's preliminary report, the January total was 600,000 tons greater than the output of December, 1958, and 2.5 million tons higher than the production of January, 1958. The most recent month with a higher total than that of January, 1959, was June, 1957, when steelmaking furnaces produced 9,391,402 net tons of ingots and steel for castings.

A SPECIAL PACKAGE LEASE PLAN for the metal fabricating industry was announced recently by the Nationwide Leasing Company, Chicago, Illinois. Under it, any combination of equipment may be considered one package and leased as a unit for three to five years. According to Robert Sheridan, Nationwide president, the package lease permits large and small firms to acquire $10,000, $25,000, $50,000 or more in equipment without capital investment. Under the Metal Fabricating Package Lease, a company could lease $10,000 worth of equipment for three years for monthly payments of $320. The $25,000 package lease would cost $800 monthly for three years, $625 monthly for four years. A $50,000 plan features three, four and five-year terms, costing $1,600, $1,250 and $1,050, respectively.

NEW DEFINITIONS OF ELECTRIC WELDING AND CUTTING TERMS have been published by the American Standards Association. Group 50 of the ASA definitions has just been completely revised, expanded and published in a separate booklet. Among new definitions are included a number on the subject of brazing, and arc and oxygen cutting, in addition to the previously covered areas of electric welding and cutting in general, arc welding, proper nomenclature, and resistance welding.

STATISTICS ABOUT THE TYPICAL WELDING SUPPLY DISTRIBUTOR include $355,000 volume per year, 6,377 square feet of space, $57,000 inventory, 12 employees and 21,500 miles traveled. These are figures developed in a statistical survey of operations of distribu-

tor members of the National Welding Supply Association. They are included in a "Who is Norm Distributor?" brochure available from the NWSA at 1900 Arch Street, Philadelphia 3, Penna. Prices are 25c each for 1-9 copies; 20c each for 14-49; 15c each for 50-99 and 10c each for 100 or more copies.

A DANISH SHIP OWNER, Knud Lauritzen, was one of the most outspoken critics of the recently sunk *Hans Hedtoft* in a bitter controversy among Danish shipping experts when the Greenland Trading Co. announced two years ago she should be built as the fleet flagship. At the time Lauritzen warned that the Hans Hedtoft, with her riveted hull, was likely to run into trouble on the iceberg-strewn route between Copenhagen and Greenland. He contended ships designed for the route should have all-welded hulls with the plated welded to the frame. He warned a riveted hull was likely to burst under any major ice pressure.

UNITED STATES PRODUCTION OF GASES AND CARBIDE are included in figures just released by the U. S. Department of Commerce, Bureau of the Census. The Bureau's report compares the first three quarters of 1958 with the same period for 1957.

	Production, first three quarters 1957	1958
Acetylene*	7,600	7,518 million cu. ft.
Calcium Carbide	756,122	640,166 short tons
Oxygen, tonnage	804,527	754,070 short tons
Oxygen, High Purity	22,572	26,120 million cu. ft.
Nitrogen**	4,388	4,832 million cu. ft.
Argon	278	274 million cu. ft.
Hydrogen***	30,069	31,573 million cu. ft.

**Acetylene figures exclude amounts produced and consumed by railroad shops, shipyards, and small establishments using portable generators*

***Nitrogen figures exclude amounts produced and consumed in manufacture of synthetic ammonia*

****Hydrogen figures exclude amounts produced and consumed in manufacture of methanol and ammonia.*

SERIES OF VANADIUM ALLOYS have been produced successfully for the first time. Now a range of vanadium sheet, not just bars and forgings, is possible, Main advantages of vanadium alloys are: (1) extreme workability—can be cold rolled over 98 percent, compared to 99-plus percent for highly malleable gold, (2) strength—a middleweight among possible aircraft structural metals, it has strength-to-weight ratio far superior, for example, to lightweight titanium's (3) good weldability. Alloys retain their strength at temperatures of 1,200 to 1,500°F. Developer is Armour Research Foundation.

BUSINESS MEN'S EXPECTATIONS for the second quarter of 1959 were optimistic according to Dun & Bradstreet's most recent compilation of business men's opinions. Seventy-seven percent of the 1,542 executives interviewed felt their sales would be higher than a year ago, 20 percent saw no change coming and only 3 percent thought sales would be below last year. This sales optimism prevailed in all the major classifications, but was a shade higher among wholesalers with 78 percent anticipating sales gains.

Circle No. 1 on Reader Service Card.

ACORN
BENDING BLOCKS
or
WELDING PLATENS
Semi-steel Blocks for layout, welding assembly work, etc., with machined working surfaces; also tools and accessories, including a full line of clamps, drift pins and dogging devices. Standard and special stands can be supplied. A 4-unit set-up, joined and mounted on stands, is shown above.
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Delaware Avenue at Poplar Street
Philadelphia 23, Pennsylvania

BMABB AHIBT

(see translation below)

- Precision
- Ruggedness
- Flexibility
- Long Life
- Electronic Drive
- Minimum Deflection
- Dynamic Braking
- Complete Automation

Welding Head Manipulator, CB 6 x 8 MD (above) provides 6' of motorized vertical travel, 8' variable speed ram travel and 360° rotation. Features self-supporting sub-base with leveling jacks, casters and lifting bail. Operates on submerged arc or inert arc—complete Welding and Manipulator control in push button station.

Better Manipulators Are Being Built And Herrick Is Building Them

WRITE FOR NEW PORTFOLIO

C.B. HERRICK MFG. CORP.

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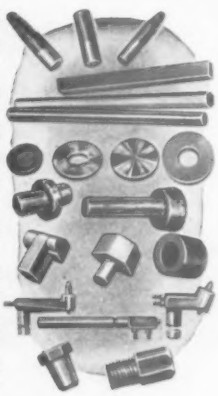
WELD WITH Tipaloy

YOUR Resistance Welding Electrode NEEDS are OUR Business!

Whether it be:
TIPS:
ROD or BAR:
SEAM WELDING WHEELS:
FORGINGS:
CASTINGS:
HOLDERS:
ADAPTERS:



SPECIAL WELDING DIES or FIXTURES: TIPALOY *has them.*

BUY TIPALOY and save money!

TIPALOY can supply you with:
RWMA Class #1, Tipaloy #100
RWMA Class #2, Tipaloy #130*
RWMA Class #3, Tipaloy #200
and other RWMA classes of alloys to fit your needs.
It is unwise to pay too much, but it is worse to pay too little!

Use TIPALOY and get 30% to 100% more performance for your money than you are now getting.

BUY TIPALOY and get TIPALOY QUALITY

Send your trial order today

*TIPALOY #130 cast and processed under our patents.

FREE: Write for your copy of Tipaloy's comprehensive new catalog.

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Circle No. 99 on Reader Service Card.

REFERENCE DATA

catalogs, handbooks, manuals

A CONTOUR SAWING MACHINE developed by DoAll Company is the subject of a new 26-page brochure. The brochure explains how the company's Pan-Arm contour sawing machine makes possible fast, economical heavy machining—eliminating use of castings or forgings. The machine's unique, articulated cutting head that removes usual job size limitations is explained in detail. **For More Information Circle No. 120 on Reader Service Card.**

OPTICAL PRODUCTS is a 24-page illustrated index which list catalogs currently available from Bausch & Lomb Optical Co. Catalog L-86 is divided into consumer, ophthalmic and scientific and technical products classifications, corresponding to the major product divisions of the company. Each catalog entry includes a cover illustration and brief descriptive data. A factual account of the contents is included and each catalog number is specified. A product index in the back of the book permits the reader to select the proper catalog by product reference. **For More Information Circle No. 121 on Reader Service Card.**

SEAMLESS STEEL WELDING FITTINGS and forged steel flanges made by Tube Forgings of America, Inc., are the subject of a comprehensive 48-page bulletin now available. Sizes, dimensions and service pressure ratings are given for the company's complete line. **For More Information Circle No. 122 on Reader Service Card.**

PIPE WELDING CLAMPS made by Jewel Manufacturing Company are the subject of a handy 6-page, pocket-size brochure. Described and illustrated are pipe, elbow, flange and angle clamps and a pipe marker. Sizes and prices are given. **Circle No. 123 on Reader Service Card.**

AN INFORMATIVE GUIDE TO WELDING PRACTICE has been combined with a new catalog of welding products by Arcos Corporation. The new 32-page brochure describes the firm's full line of stainless, low-alloy, non-ferrous rods and electrodes for manual, automatic and semi-automatic welding. Known as the "Welding Guide and Catalog," the unique service-type catalog-manual is designed to help operators select and use welding electrodes and rods. Pertinent information includes such facts as forms available, description, usual welding applications, AWS-ASTM designations, popular name type, heat treatment data for maximum properties, preheating data and tensile properties. **For More Information Circle No. 124 on Reader Service Card.**

LONG TERM CORROSION PREVENTION using Metco Metallizing Systems is the subject of Bulletin 93XG available from Metallizing Engineering Co., Inc. The new bulletin describes how pure metals firmly bonded to a steel base by metallizing can protect against oxidation for as long as 100 years. Typical applications are given. **For More Information Circle No. 125 on Reader Service Card.**

A DEPRESSED CENTER ABRASIVE WHEEL for weld grinding and general off-hand use on portable disc-type sanders and right angle grinders is described and illustrated in Bulletin ESA-244 issued by Simonds Abrasive Co. The Bulletin gives instructions on how to use the company's Double XX wheel for fastest cutting. **For More Information Circle No. 126 on Reader Service Card.**

SOLDERING ALUMINUM is the title of a comprehensive, pocket-size reference folder from Reynolds Metals Company. Types and properties of aluminum solders are explained. Data is included on fluxes, soldering irons and flames and complete information is given on actual soldering methods. Text has diagrammatic illustrations. **For More Information Circle No. 127 on Reader Service Card.**

BENCH-TYPE WELDING POSITIONERS made by Stahl Equipment Co. are the subject of a catalog sheet now available. Speed-X Model 25 (small bench positioner) and Speed 100 (medium bench positioner) are described in details. Operating characteristics and design details are given. **Circle No. 128 on Reader Service Card.**

continued on page 72

BUILT TO LAST

EMERSON ELECTRIC PORTABLE ARC WELDERS

BUILT-IN EXTRAS—Provisions for pipe thawing, cutting, and Brazing—Mounted on wheels for easy mobility—Fan Cooled—On-Off Switch.

SAFETY AND DEPENDABILITY—UL and CSA Approved—Meets NEMA and REA Requirements.

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EMERSON ELECTRIC OF ST. LOUIS • SINCE 1890

VISIT US AT BOOTH NO. 121, AWS SHOW, CHICAGO

For More Information Circle No. 33 on Reader Service Card.

JOB-PROVED
Welding Accessories
by LINDE
Oxweld GOGGLES

CAN BE WORN OVER EYEGLASSES

OXWELD No. 24 Coverall Goggles have enlarged eyecups which fit over eyeglasses. They give *comfortable* eye protection with excellent visibility—minimizing eyestrain and fatigue during welding and cutting. Frames are lightweight, heat-resistant nylon plastic with vents around lens rings for full, non-fogging ventilation. The rigid metal bar permits goggles to be raised with one hand. The standard Type "AA" green filter lenses are available in Light, Medium, or Dark shades.

Oxweld GLOVES
LONG GAUNTLET PROTECTION

Made of tough, flame-resistant suede leather, these OXWELD Long Gauntlets are 13⅜" long to provide full protection for wrists and forearms as well as hands. They are unusually soft and comfortable.

See your LINDE supplier for prompt service and a complete line of job-proved, quality equipment and accessories for every oxy-acetylene welding and cutting need.
Or write for his name and address to LINDE COMPANY, Division of Union Carbide Corporation, 30 East 42nd Street, New York 17, N. Y.

Linde TRADE-MARK
UNION CARBIDE

"Linde," "Oxweld" and "Union Carbide" are registered trade-marks of Union Carbide Corporation.

For More Information Circle No. 64 on Reader Service Card.

RESISTANCE WELDING ANALYZER is featured in catalog sheet ED 11710A from Brush Electronics Company. The catalog sheet illustrates and describes their welding analyzer Model BL-325. It lists key factors and engineering specifications.

Circle No. 129 on Reader Service Card.

PRINCIPLES AND PRACTICES OF RESISTANCE WELDING is the subject of a 28-page bulletin PP-54 issued by the Federal Machine and Welder Co. It includes data on how to calculate welding pressures, time in cycles, current in secondary amperes, gives tip diameters, projection specifications, and seam welding charts. Spot, projection, seam and flash welding are covered.

Circle No. 130 on Reader Service Card.

GRINDING ABRASIVES AND ACCESSORIES: Chicago Wheel and Manufacturing Co., has released a new 12-page catalog No. 6065 on grinding wheels, abrasives, grinders, and accessories. The catalog gives complete information on the Handee grinder and its many uses, operation instructions, and suggested applications. It completely illustrates mounted wheels, saws, brushes, cutters, drum sanders, and bands.

Circle No. 131 on Reader Service Card.

HIGH SPEED HAND WELDERS for thermoplastics are illustrated and described in new literature available from Laramy Products Company. It gives information on welding speeds and strengths, characteristics of construction, and itemized list of accessories and prices is included.

Circle No. 132 on Reader Service Card.

400-CYCLE POWER REGULATION from a 60 cycle source is described in a 6-page bulletin No. 307, issued by Safety Industries, Inc. The bulletin gives construction data, operating information, dimensions and weights on output ratings from 1½ to 10 kw units.

Circle No. 133 on Reader Service Card.

CERAMIC TOOL COMPONENTS are featured in a 4-page Bulletin No. 116 from Duramic Products, Inc. Available forms, like bushings, washers, discs, plates, rods, and V-blocks are described. It gives Dimensional tolerances, and specifications are included. The ceramic tools are used for fixturing in brazing, soldering, welding, and sintering.

Circle No. 134 on Reader Service Card.

AN ELECTRONIC LINE TRACER ATTACHMENT for flame cutting machines is featured in Bulletin N142-R-3 issued by National Cylinder Gas Division of Chemetron Corp. The Bulletin lists advantages of the new control system for the firm's Type R cutting machines in which optical sensing techniques are used to guide metal cutting torches by scanning or reading pen or pencil line drawings. Construction details, principles of operation and typical applications are given. **For More Information Circle No. 135 on Reader Service Card.**

A STAINLESS STEEL WELDING SCALE AND OXIDE REMOVER developed by Chemclean Products Corp. is the subject of a handy catalog sheet now available. How the company's Ox-Off 536 chemical compound is used is described in detail. Operating instructions are given. **For More Information Circle No. 27 on Reader Service Card.**

HOW TO ORDER GRINDING WHEELS made by American Emery Wheel Works is the subject of a comprehensive 8-page folder just issued. Featured are standard markings for grinding wheels, shapes of wheels, abrasive types, recommended applications a wheel speed conversion table. Five characteristics of "American" grinding wheels and hints for their proper selection are given. **For More Information Circle No. 136 on Reader Service Card.**

INSTRUCTIONS FOR SIGMA WELDING are given in a 48-page booklet issued by Linde Company, Division of Union Carbide Corp. Booklet F-7825 has been revised to include latest recommendations for Sigma welding on all commercially available metals. The booklet includes current, gas flow, joint design and filler metal recommended for various materials. **For More Information Circle No. 137 on Reader Service Card.**

MORE THAN 40 TYPES OF PNEUMATIC VALVES are featured in a new, condensed catalog available from Ross Operating Valve Co. Installation and maintenance information, as well as dimensional and parts data are included in the booklet. To facilitate easy reference, the valves are grouped according to methods of operation: by air, cam, manual or solenoid. **For More Information Circle No. 138 on Reader Service Card.**

OXY-ACETYLENE WELDING AND CUTTING EQUIPMENT and industrial regulators produced by 19 leading manufacturers are evaluated in a 24-page brochure from Modern Engineering Co. Fifty important design features are compared. Included are 12 pages on regulators for engineers who work with air-activated equipment or commercial gases in a wide range of industrial applications. **For More Information Circle No. 139 on Reader Service Card.**

FABRICATION OF HASTELLOY ALLOYS is featured in a 36-page booklet issued by Haynes Stellite Company, Division of Union Carbide Corporation. It covers step-by-step procedures and recommendations for welding, forging, forming, machining, grinding, brazing, heat-treating, and descaling and pickling. It also includes information on lining of vessels and corrosion surfacing along with necessary boiler code data. **For More Information Circle No. 140 on Reader Service Card.**

STAINLESS PIPE AND WELDING FITTINGS is the subject of technical data card TDC-189 published by the Tubular Products Division of The Babcock & Wilcox Company. This card tells of the high temperature properties of B&W Croloy 16-13-3 (TP316). Its chemical composition, size ranges, and short time tensile and rupture properties are given. **Circle No. 141 on Reader Service Card.**

A NEW LINE OF PRECISION LIMIT SWITCHES introduced by Cutler-Hammer, Inc., is featured in Bulletin EA-154. Described and illustrated are switches for use in industrial applications where millions of operations are required. Design details and operating characteristics are given in the illustrated 4-page folder. **For More Information Circle No. 142 on Reader Service Card.**

MAGNETIC DRILL STANDS are the subject of a 4-page bulletin available from Thor Power Tool Company. Bulletin No. 10406 describes precision drilling possibilities in difficult or remote areas utilizing magnetic drill stands whose base "locks" to any ferrous surface. The three new magnetic drill presses can be used for air or electric drills up to 2-inch capacity. **For More Information Circle No. 143 on Reader Service Card.**

continued on page 74

FOR A COMPLETE LINE OF INDUSTRIAL GASES, WELDING EQUIPMENT AND SUPPLIES

see your
LINDE
distributor

He is a welding specialist and has the technical knowledge and experience to help you with your welding and cutting problems.

Every authorized LINDE Distributor is an independent local businessman and carries a complete line of quality equipment and supplies—to give you prompt service.

A telephone call to your nearby LINDE Distributor will bring you the benefits of more than 50 years of LINDE COMPANY's pioneering and leadership in welding and cutting. If you don't know your local LINDE Distributor, look in your classified telephone directory. Or write for further information to LINDE COMPANY, Division of Union Carbide Corporation, 30 East 42nd Street, New York 17, N. Y. *In Canada:* Linde Company, Division of Union Carbide Canada Limited, Toronto.

Linde UNION CARBIDE

The terms "Linde" and "Union Carbide" are registered trade-marks of Union Carbide Corporation.

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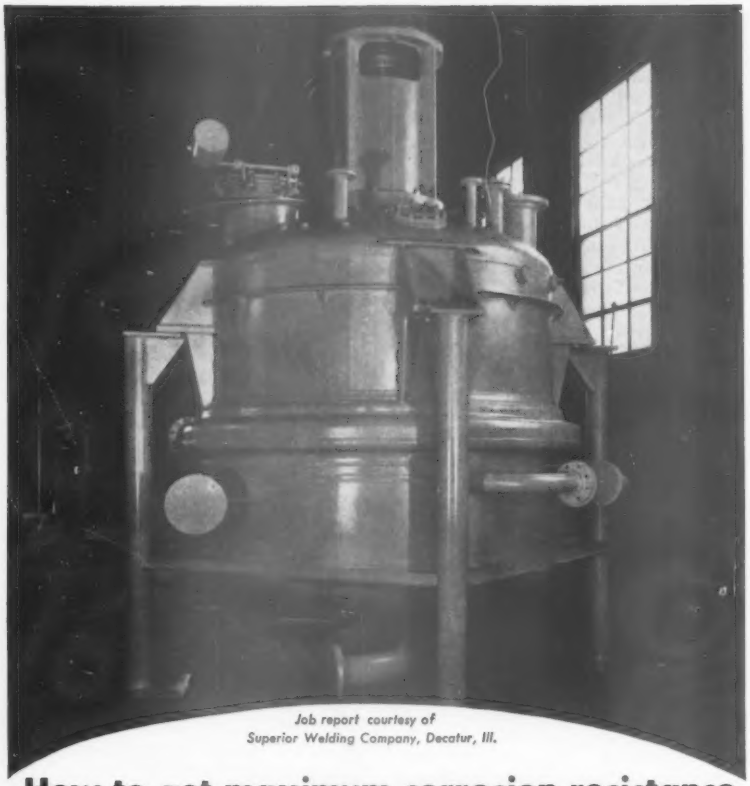


Job report courtesy of
Superior Welding Company, Decatur, Ill.

How to get maximum corrosion resistance from Welded Stainless Steels

WELD WITH ARCOS

STAINLESS ELECTRODES

This reactor type vessel is used by the chemical industry to produce paints and resins. Effective resistance to corrosion depends largely upon the quality of its welded joints. Arcos CHROMEND HCN and CHROMEND K-LC Electrodes were selected to meet these critical demands. The inner vessel is 304 ELC clad carbon steel—all other parts in contact with the charge are also 304 ELC. Whatever *your* job, there's an Arcos Stainless weld metal of the right analysis for dependable results. ARCOS CORPORATION, 1500 South 50th Street, Philadelphia 43, Pa.

For More Information Circle No. 15 on Reader Service Card.

QUALITY TRACTOR PARTS are featured in a new 28-page booklet available from Seaboard Products Co. The book lists track link and group assembly parts and engine replacement parts available for use on nationally known crawler tractors.

Circle No. 87 on Reader Service Card.

A PHOTO PORTFOLIO offered by C. B. Herrick Mfg. Corp. points out the advantages of using the company's ram-type manipulators and other automatic welding and positioning equipment. A series of 10 photographs (with captions) tells the story.

Circle No. 152 on Reader Service Card.

FREE FLUX SAMPLES are available from Krembs & Company, manufacturer of 25 different welding, brazing and soldering fluxes. Write for yours on company letterhead. Use Reader Service Card for literature.

Circle No 58 on Reader Service Card.

HOW WELDING HEAD MANIPULATORS make automatic welding profitable for both production and job shops is the story told in literature available from Lewis Welding & Engineering Corp.

Circle No. 60 on Reader Service Card.

A COMPLETE LINE OF ARC WELDERS is featured in literature from Mid-States Welder Mfg. Co. Complete details, specifications and prices are given.

Circle No. 119 on Reader Service Card.

AN AUTOMATIC INSTALLATION that gives high speed production in tractor roller rebuilding is described in literature available from Sight Feed Generator Co. Complete details and specifications are given.

Circle No. 93 on Reader Service Card.

A 10-DAY FREE TRIAL of a "Shop Caddy" is offered by Allied Mfg. & Sales Co. The handy lifting tool is said to be the answer to a thousand lifting jobs in every shop.

Circle No. 13 on Reader Service Card.

REACTIVE METAL WIRES for welding, screens, filters, faster and cables are featured in brochure which gives complete data and prices. Wires are available in .010- to $\frac{3}{8}$-inch diameters in coils or straightened. Metals are titanium, Columbium, tantalum, molybdenum, zirconium and hafnium.

Circle No. 57 on Reader Service Card.

BRASS FITTINGS immediately available from stock are featured in

catalog sheets from Oxo Welding Equipment Co. Shown are hose fittings, cylinder nuts and spuds. Dimensions are given for easy ordering.

Circle No. 144 on Reader Service Card.

RADIATION FILM BADGE SERVICE offered by St. John X-Ray Laboratory. Explained in a 4-page folder is how service is rendered to users who need protection for personnel exposed to radiation.

Circle No. 145 on Reader Service Card.

ANTI-SPATTER COMPOUND is the subject of bulletin No. 130 from American Solder & Flux Co. The bulletin describes what the chemical compound is, how to use it, why and where to use it.

Circle No. 146 on Reader Service Card.

HAND AND POWER SHEARS are the subject of a 14-page catalog available from O'Neil-Irwin Manufacturing Co. The catalog describes, illustrates, and gives specifications for a complete line of shears.

Circle No. 147 on Reader Service Card.

SILVER BRAZING PASTE ALLOYS are described in a engineering data sheet available from Fusion Engineering. The pastes are designed for automatic silver brazing with automatic dispensing equipment. The data sheet outlines three types of pastes (S-4, ST, and S-5).

Circle No. 148 on Reader Service Card.

WELDING EQUIPMENT made by Harnischfeger Corporation is the feature of a handy size pocket folder offered by the company. The folder covers a wide range of welding machines, positioners, and accessories.

Circle No. 149 on Reader Service Card.

PHASE SEQUENCE INDICATOR marketed by W. A. Walters, Inc., is described in a new data sheet. The data sheet lists specifications and advantages of this pocket-sized instrument. The easy-to-use instrument is said to be able to check 3-phase control and rotating equipment.

Circle No. 150 on Reader Service Card.

GROUND CURRENT CONDUCTION is the title of a comprehensive 16-page illustrated booklet available from Aronson Machine Co. Section 7 of "Positioneering with Aronson" gives basic facts on electricity and applies them to arc welding. It explains how to properly ground work when welding on a positioner.

Circle No. 151 on Reader Service Card.

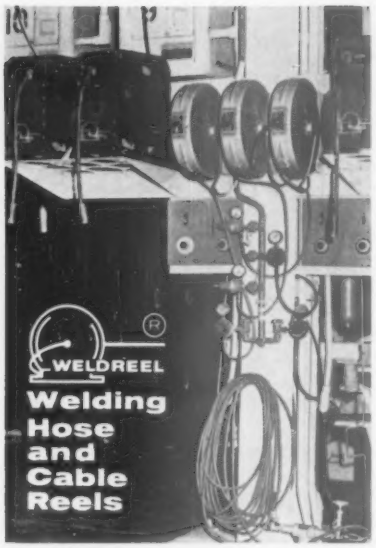
For predictable stainless welding results with submerged arc welding

Job report courtesy of National Tank Mfg. Co., Los Angeles, Calif.

use ARCOSITE BONDED FLUX

This 4,000-gallon tank for a resin reactor will handle highly corrosive material at temperatures of 500° to 600°F. Stainless top and bottom heads of type 316L were submerged arc welded to the body with Arcosite Flux and Arcos Chromenar Stainless Wire. This combination gives the proper weld metal chemistry for the needed corrosion resistance and an economical solution to the problem. ARCOS CORPORATION, 1500 S. 50th Street, Philadelphia 43, Penna.

For More Information Circle No. 16 on Reader Service Card.



AT PHILLIPS PETROLEUM

Plant safety is improved—hose and cable life extended — good housekeeping is made simpler — in Phillips Petroleum Corporation's refinery at Borger, Texas, by keeping hose and cable off the floor when not in use—with WELDREEL hose and cable reels.

WELDREEL reels pay out freely and lock automatically at desired length. A slight tug releases the locking pawl, allowing hose or cable to be automatically retracted.

Designed to handle flammable fluids and gases safely in dual and single hose, leakproof WELDREEL reels are adaptable to a wide variety of industrial applications. Write for full information.

MODEL OA-A holds 50′ of $\frac{3}{16}$″ or 40′ of ¼″ dual hose. Model OAB has capacity for 150′ of ¼″ or 125′ of $\frac{5}{16}$″ hose.

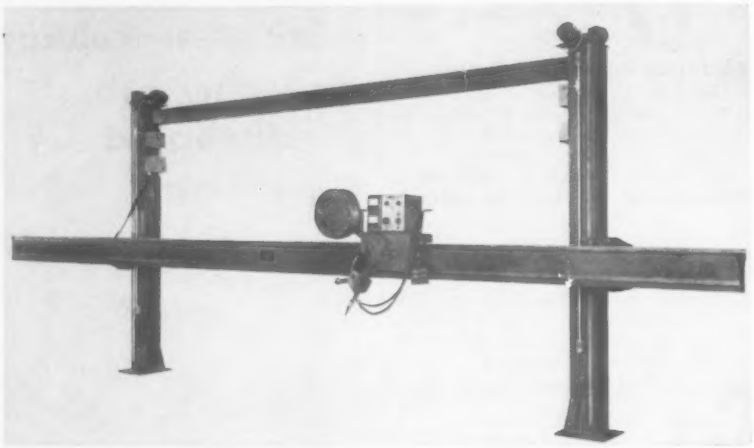
MODEL EA-2 with current capacity of 300 amps holds 50′ of 2/0 welding cable. Model EA has capacity of 100′ cable.

MODEL A-1 has 50′ capacity of ¼″ or ⅜″ I.D. single hose. The larger Model A-2 holds 50′ of ½″ hose.

UNITED SPECIALTIES INC.
POST OFFICE BOX 698 EL DORADO, ARKANSAS

Circle No. 101 on Reader Service Card.

NEW PRODUCTS



Elevating Beam Gantry

The "Shopmaster" elevating beam gantry developed by World Electric Co. can be supplied for any manufacturer's side arm travel carriage.

Model 830 provides a 30-foot horizontal travel of the welding head and 8-feet of clearance under the welding nozzle. Model 1040 provides 40-feet of horizontal arc travel and 10-feet of vertical clearance under the welding nozzle.

The beam can be angled laterally, with respect to the centerline of the columns, or the beam can be angled in either direction or operated parallel. The carriage beam can also be angled vertically or tilted with respect to the floor in either direction. This feature is for the new, high speed processes of automatic welding where welding downhill provides speed advantages.

Circle No. 160 on Reader Service Card.

Flexible Ball Mandrel for Thin-Wall Tubing

"Free-Flex" is the name of a new mandrel developed at Boeing Airplane Company's Wichita plant. The mandrel is used for making top-quality bends in thin-wall tubing. It is easy to use, durable, and versatile.

Mandrels are used to prevent flattening or crushing of tubing during the bending process. A key feature of the new mandrel is that it gives quality bends of a radius only twice the diameter of the tubing.

License to manufacture the new mandrel has been granted to the Pines Engineering Company.

Circle No. 161 on Reader Service Card.

For More Information Circle No. 28 on Reader Service Card.

Dockson WELDING AND CUTTING EQUIPMENT

QUALITY... IN DESIGN—for better functional balance and easier handling, fewer wearing parts, sturdier construction. IN MATERIALS—for longer service life, less replacements. Sturdy forgings are used instead of castings, cupro-nickel instead of brass.

DEPENDABILITY... Built for better service, to last longer and perform better. Produced under high manufacturing standards. Rigidly inspected and tested. Reliable service parts available from stock. Every item backed by the respected Dockson name and company.

ECONOMY... Low original cost. Low maintenance cost. Long, trouble-free service life. Economical, factory standard replacement parts readily available.

YOU CAN SAVE with Dockson

- WELDING TORCHES
- WELDING OUTFITS
- GOGGLES
- CUTTING TORCHES
- REGULATORS
- FACE SHIELDS
- FITTINGS
- SOLDERING TORCHE
- HELMETS
- FLUX
- ACCESSORIES

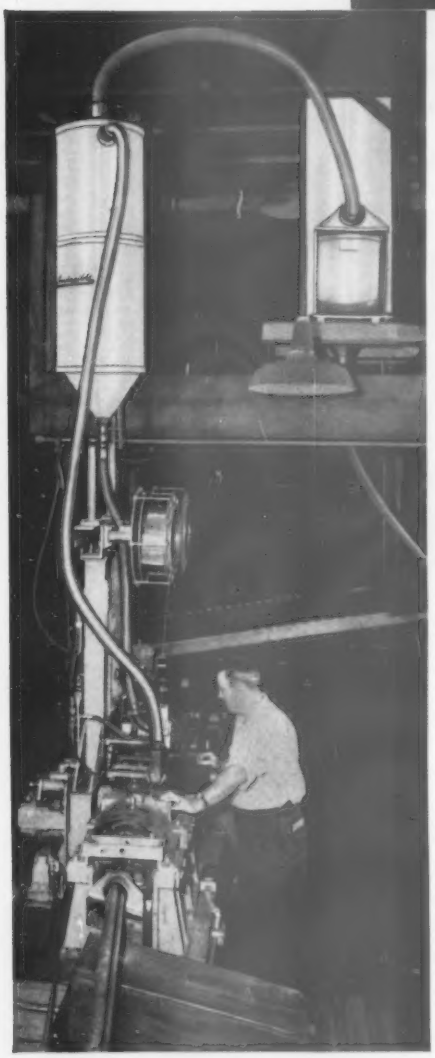
Write for complete catalog and name of your nearest distributor.

Dockson CORPORATION

3839 WABASH AVENUE · DETROIT 8, MICH.

Savings in reclaimed flux alone have paid for Invincible units in a few months, or even weeks, on submerged arc welding jobs.

INVINCIBLE
Welding Flux Recovery Systems
MAKE 3-WAY SAVINGS



Operating continuously, this Invincible recovers all unfused flux from pipe-seam welding operation at a leading automotive firm.

1 *Valuable Flux Reclaimed. Automatic* Invincibles recover *all* unfused flux and return slag-free, dust-free usable flux to the welder — *all in one continuous operation.*

2 *Costly Man-Hours Saved.* Invincibles do the complete job automatically — far more swiftly and efficiently than manual methods.

3 *Fewer Expensive Rejects.* Invincibles remove all fine dust (flux flour), thus reducing welding rejects and speeding production.

Many Important Advantages

- Ruggedly built to resist abrasive nature of flux.
- Compact and lightweight. Variety of models and flexibility eliminate need for tailor-made installations.
- Portable units also available.

WRITE TODAY FOR FOLDER on Invincible Flux Recovery Systems.

INVINCIBLE VACUUM CLEANER MFG. CO.
DOVER, OHIO

For More Information Circle No. 55 on Reader Service Card.

Induction Heater

This new 400-cycle motor generator induction heater made by Electric Arc, Inc., is used in welding for pre-heating and stress relieving light gauge materials. The Smith-Dolan induction heater is said to have good heat penetration up to a maximum of 1½" thickness. Like their 60-cycle (transformer) units, it is portable for heat treating in the field. Electronic instrumentation provides for push-button control of the rate of temperature rise, holding time, and cooling cycle in accordance with code or job specifications.

Circle No. 162 on Reader Service Card.

Hard Facing Alloy

A new hard facing alloy has been introduced by Crucible Steel Company of America. A non-ferrous material designed for hot work applications, Rexweld 66 is said to be highly resistant to thermo-shock, impact and compressive loads at high temperatures; it will not chip or spall under severe service.

The cast nickel-chromium-molybdenum-tungsten alloy is designed to produce smooth, sound weld deposits by inert gas arc or metal arc welding. Coated with a special low hydrogen coating, the electrode allows all-position welding of various tool and die steels without cracking or porosity.

Circle No. 167 on Reader Service Card.

Single-Stage Regulator

A new line of single-stage, inverse-type station regulators for low pressure service, the Airco 9900 Series, has been announced by Air Reduction Sales Co.

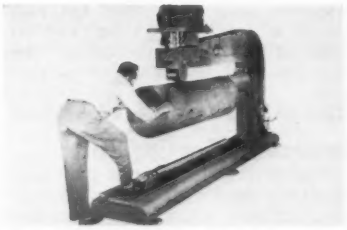
Frequent adjustment of the 9900's is unnecessary because low internal friction and large, flexible diaphragm design gives accurate regulation with little delivery pressure variation. Diaphragm is strengthened with nylon fabric insert. Spring case won't leak because it seals against a rubber ring. Knob is ribbed for sure grip.

Circle No. 164 on Reader Service Card.

Adjustable Centering Tool

A new adjustable centering tool made by the Line-O-Tool Co. is used for grinding bevels on pipe prior to welding in the shop or field. Tool is adjustable for pipe sizes 6" through 24". It can be adapted for use with any standard right-angle air grinder. Tool consists of an adjustable centering device which acts as a holder for an adjustable adapter to which the air tool is attached.

Circle No. 165 on Reader Service Card.



Weld Planisher

Airline Welding and Engineering has introduced their 1959 model roll planisher for working fused butt welded joints in any metal in .003" to .500" thicknesses. The planisher "peens" the columnar weld structure to: relieve shrinkage stresses from both weld and parent metal; smooth crest and root beads to aerodynamic contour; and, prepares welds without further finishing for other severe processing.

Circle No. 166 on Reader Service Card.

Turntable Positioner

Miami Specialties Co. has introduced a new turntable positioner that has a capacity of 500 pounds at center of gravity 6" above the table surface and 3" off center of rotation.

The unit has a constant speed range of ¼ to 5RPM, and has reversible rotation. The positioner table can be free wheeled by placing the speed selector switch on neutral.

The positioner table top tilts 135° while loaded, and is removable. Fixtured tops can easily be mounted on the unit. A limit switch protects the tilt mechanism.

Circle No. 163 on Reader Service Card.

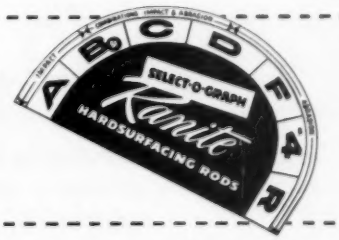
Ranite–The ORIGINAL Metallic-Coated Hardsurfacing Rod

is still easiest to select, easiest to use and offers the most advantages!

NO OTHER HARDSURFACING MATERIAL OFFERS ALL THESE ADVANTAGES:

- Equally good operation with AC and DC machines
- Readily applied in all positions
- Quiet, stable arc
- No Splatter loss
- No slag to remove
- Clear welding vision
- Economical because there is minimum of flux, maximum of material to enter weld
- Arc easily re-struck, if broken for any reason
- Very little tendency for deposit to check because rods alloyed with proper coefficient of expansion
- Firm bonding of deposit to base metal
- Ranite-coated surfaces can be torch-cut when necessary, thus reducing repair costs
- Rapid deposition rate cuts welding time
- High recovery rate assures more *deposited* metal per pound
- Broad latitude of Ranite rods gives weldors ample leeway in selection and use
- Correct rod selection is simple and easy–the big majority of all jobs are handled by just five Ranite rods–A, BX, C, D and No. 4

GET FREE Ranite Select-O-Graph Guide—shirt pocket size—shows best rod to meet any wear condition. Ask your Ranite distributor or write direct.



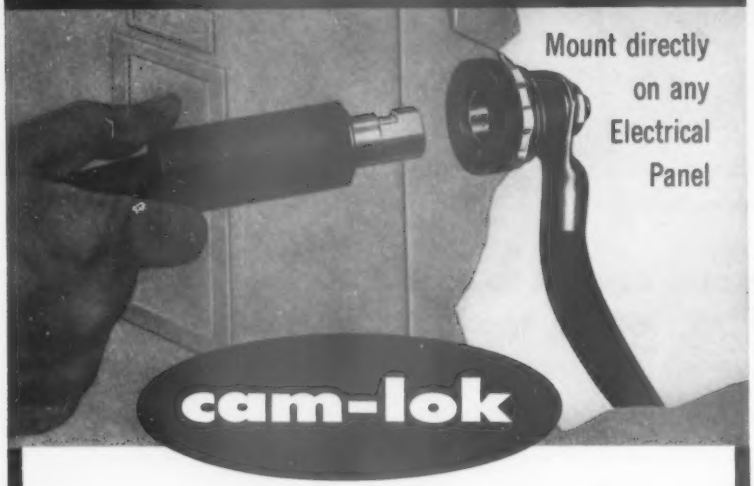
Originators and pioneers of metallic-coated rods—since 1938

Ranite
WELDORS' NO. 1 CHOICE FOR HARDSURFACING

RANKIN MANUFACTURING CO.
616 So. Marengo Ave., P. O. Box 631
Alhambra, Calif.

For More Information Circle No. 83 on Reader Service Card.

New Hi-Impact Plastic Insulated Panel Receptacles and Mating Plugs



Now, you can make fast, positive power connections to any metal panel or housing without special insulating materials. Simply punch out a hole and insert a Cam-Lok self-insulated Receptacle! Uses standard electrical lock-nuts, affords "dead-front" protection. Push in and twist Cam-Lok mating Plug and you've made a locked connection, which can be released quickly.

New Cam-Lok Receptacles eliminate costs of special insulating panels and reduce assembly time. Patented, high-pressure contact assures minimum resistance and heating.

Cam-Lok has a complete line of Receptacles and Plugs in many sizes and designs. Standard and special purpose Power Distribution Connections are available. Write today for new Bulletin No. 301.

"Dead Front" design for fast
direct mounting on . . .

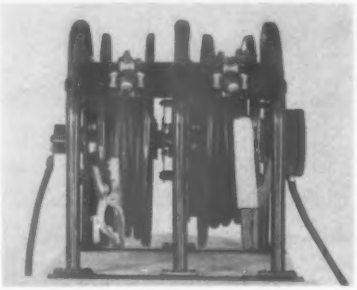
• ELECTRICAL DISTRIBUTION PANELS • SWITCHGEAR
• BUS DUCT • JUNCTION BOXES
• WIREWAY or any electrical cubicle

See the Cam-Lok line, Booth #217, AWS Welding Show, Chicago International Amphitheater, April 7-10.

cam-lok DIVISION

EMPIRE PRODUCTS, INC.
P.O. BOX U-98
CINCINNATI 36, OHIO

For More Information Circle No. 23 on Reader Service Card.



Dual Cable Reel

A new double reel for both electrode and ground cable has been introduced by United Specialties Inc. Each twin reel holds 50 ft. of 2/0 cable or shorter lengths of 3/0 or 4/0. Current capacity is 300 amps with 60% overload factor for intermittant operation. Designed for either portable or fixed use, the Model EA-10 Weldreel is of strong, tubular construction. Heavy duty retracting spring and locking pawl lets the cable be pulled out and locked at any length, then released with a slight tug on the cable. Can also be used for other two-cable jobs.

Circle No. 168 on Reader Service Card.

Improved Cutting Aids

Improved attachments for their standard pipe cutting and beveling machines has been announced by the H & M Pipe Cutting and Beveling Machine Co.

The lightweight Shape Cutter features easy, fast mounting for automatic pipe intersection cutting.

The Out-of-Round attachment now has a free-wheeling roller assembly that turns 360 degrees. The roller rides the pipe and corrects for imperfections; it adds accuracy and precision in cutting out-of-round pipe.

Circle No. 169 on Reader Service Card.

Anti-Seize Sealant

"Led-Plate" No. 250F is the name of a new anti-seize sealing compound produced by Armite Laboratories. The compound with filler added stops spiral leaks from large diameter threads and coarse fittings. It also stops leaks in welded flanges that have become oval or distorted, and is said to be good for clean-out plugs.

The sealant is a non-corrosive, non-hardening lead compound. Sealant will handle heats up to 2987°F and pressures up to 50,000 psi.

Circle No. 170 on Reader Service Card.

65-Pound Welder

A new 65-pound welder introduced by Radson Engineering Corp. is said to have more weld-power than welders weighing 250 pounds, or more.

The new welder is said to employ a full 50% duty cycle as compared to 20 to 30% for less efficient welders four or more times its size. The welder has a full variable range from 50 to 200 amps. This is accomplished by a sliding shunt that provides heat control to the exact ampere for any weld job.

The welder operates on a low line draw of less than 30 amperes to meet REA specifications. Open circuit voltage is only 40 volts making the welder safe from shock hazards.

Circle No. 171 on Reader Service Card.

Gouging Electrodes

"Groovees" developed by Aufhauser Brothers Corp. for removing surplus metal, come in ⅛" and $\frac{5}{32}$" diameters and are said to be equally effective on steels, cast iron, and non-ferrous metals. Electrode has steel wire core which prevents carbon pickup, will work on AC or DC without air or oxygen, and leaves a clean, scale-free surface, ready for rewelding.

Circle No. 172 on Reader Service Card.

Gas-Saving Torch Holder

The Harris Calorific Company has announced a dual-purpose new product, their Model 64-2 Gas-saver.

On the hook, the torch flame snuffs out. Lift the torch, and a pilot light makes the flame snap on; torch valves don't have to be touched.

Used where automatic torches aren't, the leak-proof Gas-saver can cut costs and add convenience.

Circle No. 173 on Reader Service Card.

Horizontal Plate Clamp

The latest device put on the material handling market by Merrill Brothers is a new clamp developed for handling large, unwieldy steel plates. All parts are drop forged and heat treated. Used in pairs, this new device is said to speedily and efficiently grip, hold and convey swinging, jerking loads in complete safety.

Circle No. 174 on Reader Service Card.

You can't see it... but it saves you **MONEY**

HIDDEN CLUTCH DOUBLES ***gear and motor* LIFE...**

MOST POWER PER DOLLAR

Milwaukee PROFESSIONAL POWER TOOLS

SANDER-GRINDER

Especially Built for the Welder. Perfect tool for grinding down welds, casting fins and risers. Milwaukee's *exclusive* coaster brake clutch drive absorbs backlash and shocks . . . doubling gear and motor life. Large cyclonic fan and specially designed exhaust ports provide extra ventilating capacity . . . cooler running. Totally enclosed grit-proof, dust-proof trigger switch. Powerful, no-stall MILWAUKEE motor delivers a full 1½ HP *at the spindle* . . . 5000 RPM . . . ball and roller bearings throughout.

See us at Booth No. 900
NATIONAL WELDING SHOW . . . .
Chicago, April 7 - 9th

Find Us Fast In The Yellow Pages
Look under "Tools-Electric"

Milwaukee Electric Tool Corporation
5318 West State Street • Milwaukee 8, Wisconsin

For More Information Circle No. 73 on Reader Service Card.

GB 88 FLUX .. available in 3 oz., ½ lb., 1 lb., 5 lb. jars and 25 lb. drums to suit *your* needs

Use GB 88 Flux, the flux of proven dependability and note the improvement in the quality of your Silver Brazing. GB 88 is fully active to 1650°F.

Low glare and low fuming characteristics insure operator comfort and quality results. It is stable in use as well as in storage and was developed for Silver Brazing of STEEL, BRASS, COPPER, STAINLESS STEEL, MONEL, NICKEL, INCONEL, CHROME ALLOYS, SILVER and GOLD.

For best results team up GB 88 Flux with GB Silver Brazing Alloy in the form or size you require: random coils (all diameters), strip, straight lengths, pre-formed rings and special shapes. Prompt service on all inquiries.

1887 - 1959 90th ANNIVERSARY

Goldsmith Bros.
SMELTING & REFINING CO.

111 N. Wabash Ave., Chicago 2, Ill. • 74 W. 46th St., New York 36, N.Y.
OAKLAND

WRITE TO US

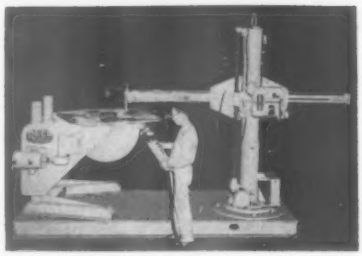
ON YOUR COMPANY LETTERHEAD

FOR

A FREE

WORKING SAMPLE

For More Information Circle No. 43 on Reader Service Card.



Fixture-Positioner Pair

Two recent developments of the Webb Corp. are the 360° Mast and Boom Fixture and the 6,000 Lb. Positioner.

Fixture is designed for high work load, low deflection longitudinal or head positioning welding. Main sections are heavy tubes with wiring inside. Locking devices and counterweights have been eliminated and vertical adjustment is made through an acme screw.

A 10 to 1 ratio chain drive, double reduction box and rack and pinion drives the boom, is located at the base of the fixture, eliminating overhead maintenance.

The Positioner features a heavily constructed work table mounted on a large ball race. Vertically adjustable, table has power tilt.

Circle No. 175 on R eader Service Card.

Electronic Welder Control

Weltronic Company has introduced an all electronic NEMA N2 welder control designed for the general user. Unit features high speed performance and has optional functions — slope, post heat, forge, electronic firing of valve and contactor, etc.—available as plug-in features.

Circle No. 176 on Reader Service Card.

Propane Cylinder

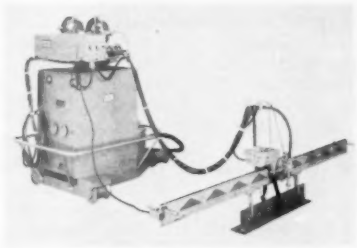
A new 6-lb. capacity propane cylinder designed for use with a wide variety of standard and special valves for any type propane service can now be obtained from Linde Company, Division of Union Carbide Corporation.

The new cylinder can be used with all LP-Gas soldering, heating

and brazing equipment, and can be adapted for trailer use.

It can be used for liquid or vapor service in the vertical or horizontal position, depending upon the type of valve selected. It weighs 14 lb., complete with valve, and has an overall length of 29-inches and a diameter of 6-3/16-inches.

Circle No. 177 on Reader Service Card.



Twin Fillet Welder

A new twin fillet machine made by L and B Welding Equipment, Inc., permits automatic welding of stiffeners, flanges, and other structural components from corner to corner.

This heavy duty, aluminum-constructed machine carriage and power supply features dual automatic wire feeds and can be used individually for semi-automatic applications. The mechanized welder offers flexibility and ease of handling for a variety of applications in structural, fabrication plants. Units are available for submerged melt, inert arc, and other consumable welding processes.

Circle No. 178 on Reader Service Card.

Arc-Spot Welding Gun

A new arc-spot welding gun model G introduced by Brennen, Bucci & Weber, Inc. is said to weld sheet metal from one side, requiring no back up electrode.

The gun weighs 2-lbs. and employs a automatic timing control. The gun is simple to use; it has no levers or triggers. It will weld galvanized steel as-well-as plain.

Circle No. 179 on Reader Service Card.

Miniature Toggle Clamp

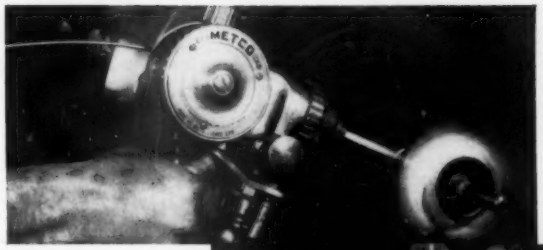
A new series of tiny toggle clamps introduced by the Lapeer Manufacturing Co. Features a horizontal handle.

Each clamp has a 7/8" and 9/16" reach, and respectively give 100 to 150-pounds of clamping force.

The series includes four distinct model designs: a twin flange base; a left-flange base; a right-flange base; and a straight base for side mounting. Pins have 80% bearing area (min) and are in double shear. This is said to prevent tilting or side thrust of the clamping spindle.

Circle No. 180 on Reader Service Card.

Complete your shop with this modern metallizing installation



WIRE GUN
Sprays any metal that can be drawn into wire form.

POWDER GUN
Sprays hard-facing alloys and ceramics in powder form.

Without metallizing no maintenance or "job" shop can offer the same complete service as the shop that uses industry's low-cost "putting-on" tool.

With modern, low-cost metallizing equipment you can spray carbon steels, stainless, babbitts, brass, bronze, nickel, aluminum, tin, zinc, special hard facing alloys including tungsten carbide.

- **Save up to 90% of replacement costs on machine repair jobs**
- **Do your own hard-facing at high speed, low cost**
- **Apply long-wearing, corrosion-resistant coatings**

A real opportunity for the smaller shop

Thousands of large, well-known companies and shops have been metallizing users for many years, not only in maintenance work but in production applications on original equipment. Now, with modern low-cost metallizing equipment this high-speed "putting-on" tool is within the reach of even the smallest shop.

FREE BULLETIN

Send off the coupon for detailed information — find out how a metallizing installation can pay for itself in a very short time. No obligation, of course.

Metallizing Engineering Co., Inc.
1179 Prospect Ave., Westbury, L. I., New York

Please send me free bulletin on metallizing.

Name _____

Title _____

Company _____

Address _____

City _____ Zone _____ State _____

METCO

Metallizing Engineering Co., Inc.
1179 Prospect Ave., Westbury, L. I., New York · cable: METCO
In Great Britain: Telephone: EDGEWOOD 4-1300
METALLIZING EQUIPMENT COMPANY, LTD.—Chobham near Woking, England

For More Information Circle No. 76 on Reader Service Card.

UNIFORMITY

Reason why—it Pays to Specify
Phoson and **Sil Bond** Brazing Alloys

Results are what you pay for when you buy brazing alloys . . . rejection-free results! Getting these results depends upon the uniformity of alloy of the brazing rods and rings you use. That's why United homogenizes Phoson and Sil Bond brazing alloys . . . giving them unexcelled uniformity of alloy. Another reason why, for rejection-free results, it pays to specify United Phoson and Sil Bond! Available in coils, straight lengths and preformed rings through your welding supply wholesaler, or direct from:
United Wire and Supply Corporation
Providence 7, Rhode Island

BELLOWS ASSEMBLY . . . . TYPICAL APPLICATION OF UNITED SIL-BOND

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SIL-BOND
.047 WIRE

For silver brazing alloys . . . For aluminum, brass and copper wire and tube . . . always **Specify**

UNITED

Process X-Ray Films Automatically

Processing industrial radiographs automatically is now possible with the new Kodak X-Omat Processor. According to Eastman Kodak Company, the equipment delivers a dry industrial radiograph in 13 minutes, an hour faster than most hand-operated methods now in use.

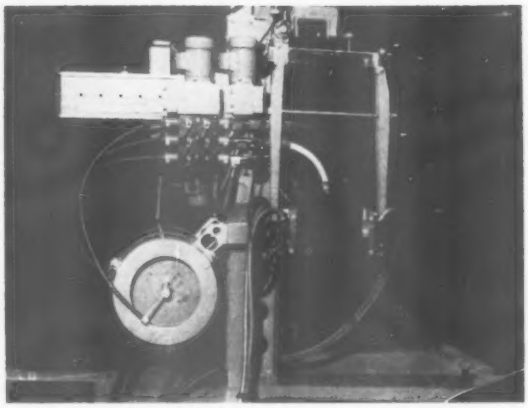
The "X-Omat" processing system was first introduced to the medical radiography field in 1957. The Industrial X-Omat has adapted the same principles to the processing of the more heavily coated industrial X-ray films.

Mechanical firsts include self-threading and a continuous transport, using a series of precision rollers to convey the film through the processing cycle. Accepting continuous lengths of roll X-ray film up to 17-inches wide, the "X-Omat" can also process several narrower strips side-by-side.

Chemical advances pioneered for the processers include new chemicals which speed up the processing cycle. They provide for dry films in less than two minutes after washing, and maintain uniform, high-quality radiographic results.

The new processor handles all listed sheet sizes of Kodak X-ray film: Types AA and M, used in radiographic quality control.

Circle No. 181 on Reader Service Card.



Electroslag Welding Machine

The electric welding process known as the "Electroslag Process" has been under development in Europe. The "Vertomatic" machine designed for this new process permits butt welding of plates from one-inch thick and up in a single pass in the vertical position. The machine comprises one or more electrodes which supply the welding heat under a molten slag. The plates are mounted vertically, allowing a spacing between the flame-cut butt edges and permitting an access for the electrodes. Water-cooled shoes are placed against both plate edges, which contain the molten metal and slag, and provide the temperature-sensing probes which actuate, through newly-designed electronic controls, the automatic upward travel of the welding process.

The process is said to permit deposition rates of

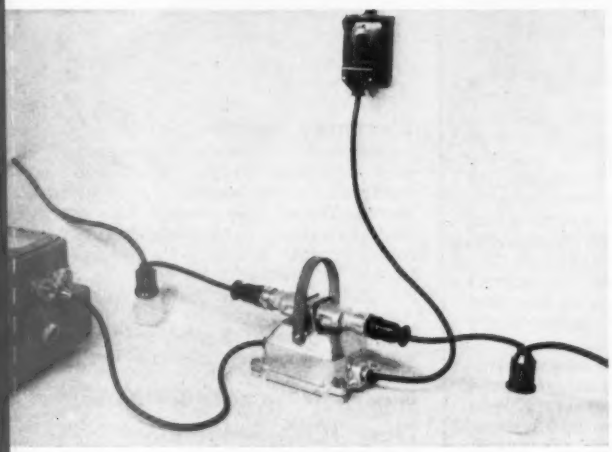
←For More Information Circle No. 102 on Reader Service Card

.055 to .065 pounds per amper per hour. In 2-inch thicknesses, the complete weld is made in one pass at the rate of four to six feet per hour.

Excellent mechanical properties, including impact resistance, are said to be obtained with special filler metals and fluxes.

The process is suitable for welding heavy thicknesses of alloy steels.

Circle No. 182 on Reader Service Card.



Radiation Flash Warning

A flashing light warning device to be used in connection with any Fedrex X-ray set has been announced by Fedrex U.S. Red lights flash when X-ray unit is switched on, automatically stop flashing when exposure is completed.

The unit consists of a 10-lb. relay box, and cable available in lengths of 165 feet; sockets are spaced about every 6 feet. All that is required to make the warning system operative is to plug it into control and mains. All Fedrex X-ray units can employ the device with a simple conversion.

Circle No. 183 on Reader Service Card.

Portable Semiautomatic Welder

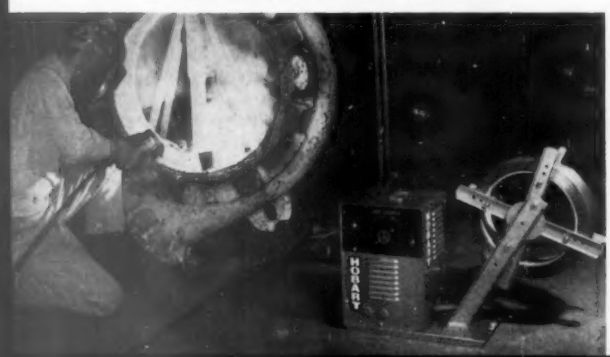
A unit designed for either open arc hardsurfacing or submerged arc welding has been announced by Hobart Bros. Co. Known as Handomatic, unit has a universal wire feeder for either solid or tubular wires; a single rheostat controls feed-speed.

Weighing 100 lb. complete with wire reel, support, base, and gun and cable assembly, Handomatic is ready to use by connecting the welding cables and one ground wire from the unit with almost any AC or DC welding machine.

Components are available for $\frac{5}{64}$" and $\frac{3}{32}$" solid hard wire; and $\frac{3}{32}$" and $\frac{7}{64}$" tubular wire. Unit is designed for use with continuous current up to 500 amperes with the flux type or open arc gun.

Handomatic is well ventilated; the wire feed mechanism is easy to get at. Regular wire-speed range is 60 to 260 ipm; optional 90 to 460 ipm.

Circle No. 184 on Reader Service Card.



For More Information Circle No. 37 on Reader Service Card.

the **ONLY PORTABLE NIBBLER** *that* **CUTS METAL** ***Without Distortion!***

Model HN for 10-Gauge Stainless and 8-Gauge Mild Steel. 6" radius.

Pneumatic Nibbler for 10-Gauge Stainless and 8-Gauge Mild Steel. 6" radius.

Model MN for 14-Gauge Stainless and 13-Gauge Mild Steel. 1" radius.

Model LNC for 16-Gauge Corrugated Sheet Metal and Sheet Metal Pipe. 1" radius.

See us at Booth #326 at the Welding Show.

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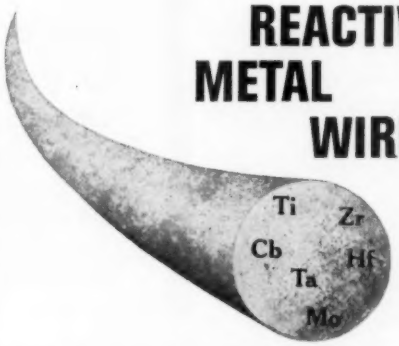
MACHINE COMPANY, INC.
3107 N. Broad St.
Philadelphia 32, Pa.

Pat. #2278174 • #7278311 • #2535631

J & F . . . pioneer source for

REACTIVE METAL WIRE



For welding, screens, filters, fasteners, cable — .010 to 3/8 — coil or straightened — certified quality

Whether you need a few pounds or production tonnage, J&F will give you fast delivery, competitive prices, certified quality — on reactive metal wire in commercially pure form . . . in a wide selection of special alloys . . . in alloys to your own specifications.

J&F wire is the product of integrated, no-compromise operation. Metallurgists who have spearheaded reactive metal development guard your order at every processing step.

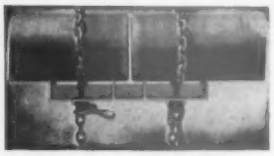
Put J&F's ground-floor experience to work for you by arranging for an early meeting — or write for facilities brochure, complete wire data and prices.

J&F Johnston & Funk
METALLURGICAL CORPORATION
WEST KEMROW AVENUE, WOOSTER, OHIO
A subsidiary of Mallory-Sharon Metals Corporation

For More Information Circle No. 57 on Reader Service Card.

Circle No. 115 on Reader Service Card.

SEE JEWEL FOR . . .



The JEWEL Pipe Clamp
. . . aligns and holds pipe for tacking. Two sizes: ½" to 8" and 8" to 16". Sturdy construction for hand usage.

The JEWEL Elbow Clamp
. . . lines up welding elbows from 2½" to 8" at right angles to the pipe and holds them until tacked.

The JEWEL Pipe Marker
. . . marks a perfect hole and saddle on any pipe up to 20".

The JEWEL Angle Clamp
. . . holds branch line at right angles to the main or headers. Takes any size main or branch from ½" to 12".

The JEWEL Flange Clamp
. . . lines up the flange face at right angles to pipe end and holds until tacked. Takes size from 2½" to 16".

Write for Details

Jewel Manufacturing Co.
1841 University Ave., St. Paul 4, Minn.

NEW PRODUCTS *continued*

New Helmet Headgear

The new, inexpensive Fit-Rite headgear introduced by Flood Safety Products Co. is said to be comfortable, durable and easy to maintain. Its design is entirely new in that it "contours in" so that the whole band fits the head, not just at the bottom. The rear strap is *offset downward* to give a lower, firmer, hat-like support for the helmet.

Instant adjustment to correct size is made by turning the rear ratchet knob, which holds firmly after size is selected.

Pivoting cross strap automatically positions on the head where it will be most comfortable. Eight holes, four at each end of the strap, provide a full range of crown-height adjustment.

Headgear is attached or detached from helmets in a matter of seconds—without tools and without removing friction units.

The headgear is made of tough, ebony-finished Nylanite (nylon), a smooth, flexible material that will not warp, shrink nor become brittle with use. It weighs 25 percent less than previous types.

Circle No. 205 on Reader Service Card.

Electrode Holder

Designed for ease and economy of maintenance is the Tong-Grip electrode holder manufactured by Martin Wells. The 10-part holder has no screws, bolts or rivets to contend with. The Slip-On insulator can be changed in seconds right on the job without bench work. Another advantage: the small upper jaw permits better operator vision, encourages him to burn electrodes shorter.

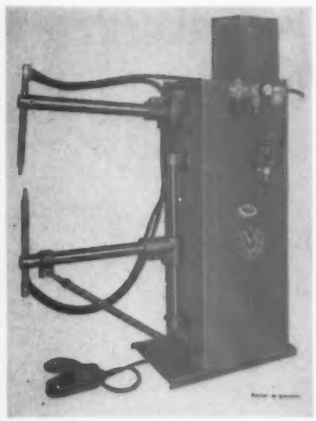
Circle No. 185 on Reader Service Card.

New 1000 Ampere DC Welder

Miller Electric Mfg. Co. has announced a new welder which delivers 1000 amps of DC at 40 volts on 100% duty cycle. Used with three-phase power lines, the SR-1000-AL features a completely sealed semi-metallic rectifier.

Single current range adjusts output from minimum of 200 amps to maximum of 1600. This model is said to be a satisfactory power source for heavy submerged arc welding, the plasma jet process, carbon arc-compressed air gouging and some electric furnace applications. Requires less than 9 sq. ft. of floor space.

Circle No. 186 on Reader Service Card.



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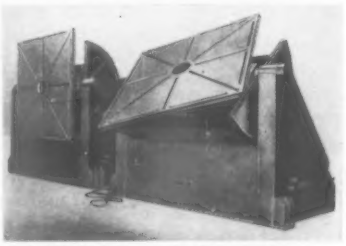


85,000 Pound Capacity Welding Positioner

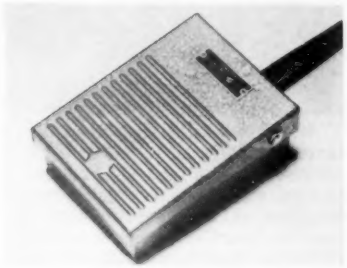
A new welding positioner introduced by Aronson Machine Co. is designed for weldments up to 85,000 lbs.

Designed for both manual and automatic welding this versatile positioner provides a 90° forward-tilt and a 45° back-tilt from the flat position. It has four speed ranges—0.40 RPM for small diameter weldments and speeds as low as 0.006 RPM for large diameters.

For More Information Circle No. 11 on Reader Service Card.

The unit occupies 93.6 square feet of space, and is said to increase weld production as much as 50%. The positioner when shipped is ready for immediate use.

Circle No. 187 on Reader Service Card.



Foot Switch

A new single-unit switch called Hi-treadlite has been introduced by Linemaster Switch Corp. to meet the need of a lightweight (9½ oz.), long life switch.

The easy-to-wire switch has but one cord, comes in single pole, double throw, double break; or simulated double pole, double throw—all with high electrical ratings. It is 3½" x 2½" x 1¼" in size and has a strong steel housing with skid-proof rubber base pad.

Circle No. 188 on Reader Service Card.

Hand Operated Shear

A new hand operated 36" shear with an inclined ram introduced by O'Neil-Irwin Mfg. Co. is said to have much greater mechanical advantage than is possible with a shear operated by leverage only.

Called Di-Acro Shear No. 36, this machine enables shear blades to be set at an angle so that the blade edge is in contact with the material thus reducing shearing force. Mild steel up to 16 gauge can be cut across the 36" width.

Fast, accurate gauging is possible by means of a micrometer operated back gauge. Gauge assembly moves back and forth on lead screw 24" long. One turn of the dial moves the gauge one tenth of an inch.

Circle No. 189 on Reader Service Card.

Self-Fluxing Brazing Alloy

A new thin-flowing alloy (Ambraze 211) has been developed for fluxless copper to copper joints by the American Brazing Alloys Company. It was developed to replace expensive silver soldering.

Ambraze 211 is a 93-copper, 7-phosphorous alloy with a brazing range of 1350 to 1550°F. It comes in 5 diameters ($\frac{1}{16}$ through ¼), and works well on brass and bronze. Company offers a special price on a trial pound.

Circle No. 190 on Reader Service Card.

AC/DC Inert Arc Welder

The Magna-Tran line introduced by Mid-States Welder Mfg. Co. is basically a single phase AC transformer welder that can easily be converted into an AC/DC or an AC/DC inert arc welder.

By making use of the high frequency voltage built into the machine, it readily becomes an inert arc welding machine. A special "Plug In" control panel makes it possible to include gas pre-flow, high frequency drop out, gas post-flow and spot arc in the fundamental inert arc welder by merely plugging in the appropriate timer.

Circle No. 74 on Reader Service Card.

Circle No. 116 on Reader Service Card.

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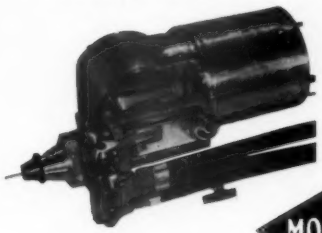
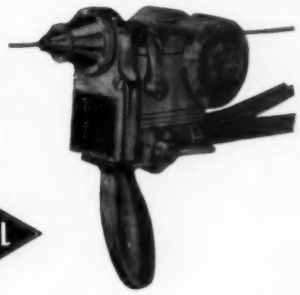


. . . with the MOGUL TURBO-JET with new magnetic air control



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For More Information Circle No. 59 on Reader Service Card.

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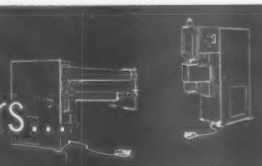
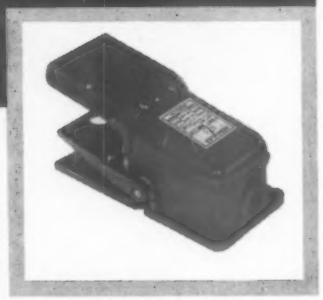


the best WELDING EQUIPMENT
must have the best
FOOT SWITCH!



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Oil-tight neoprene seals!
Safety guarded!

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—look to *LINEMASTER*
Inquiries invited

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Woodstock, Conn.

LINEMASTER SWITCH CORP.

For More Information Circle No. 67 on Reader Service Card.

New IPM Gauge

A device that helps determine instantly the speed in inches per minute on various welding operations has been designed by Cecil C. Peck Company. So small it fits in the palm of the hand, the direct reading gauge gives accurate figures in inches per minute when timed by a stop watch. It has instant reset and is accurate within 1/10 of one percent.

Circle No. 81 on Reader Service Card.

Cable Repair Kit

The Insul-Lock Welding Products Division of the F. M. Anthony Company has announced a rugged, portable welding and power cable repair kit which includes a circumferential crimping tool, cable cutter and insulation mounting tool.

Completely hand operated, the kit uses no heat, no power attachments, or dies or molds and takes but a few seconds to effect a repair. The kit is ideal in the shop or in the field. It can be used to fabricate, maintain, and repair flexible cable sizes, #4 through 500MCM. Insulators are made from a special neoprene compound which are pressure-fit to make a connection water-tight.

Circle No. 191 on Reader Service Card.

Volatilizing Flux

A new volatilizing flux, which permits brazing in hydrogen or dissociated ammonia atmospheres such traditionally "hard-to-braze" materials as A 286, 17-7-PH, Inconel X, GMR 235 and Udimet 500, is now available from the Stainless Processing Division of Wall Colmonoy Corp.

Vapo-Flux is said to be especially useful in atmospheres where hydrogen is not suitably reactive. It is available as a powder for mixing with powdered brazing alloys and Nicrobraz cement, or in solution for coating mating surfaces prior to brazing alloy application.

The material is recommended for use with aircraft assemblies, such as honeycomb sandwich structures for high temperature service, and similar applications requiring 1800-2000°F brazing temperature range.

Circle No. 192 on Reader Service Card.

Tungsten Arc Torches

Available in both water- and air-cooled models, 10 different Vis-Arc tungsten arc torches are being marketed by K-G Equipment Co. The water-cooled torches are equipped with full ⅛-inch water passages for better cooling and better flow, virtually eliminating mineral deposit buildup in tubes.

All torches feature a "heatbreak" fiberglas washer between nozzle and the silicon rubber-insulated head. Torches are said to be durable, perfectly balanced and easy to maintain.

Circle No. 193 on Reader Service Card

New Weldable Alloy

A new air-hardening, weldable and fully martensitic alloy has been developed by the Carpenter Steel Co. to meet the need for a metal that can be used for highly stressed parts at temperatures up to 1050°F where joining is a problem.

Carpenter 404 alloy is designed to be free from weld cracking without preheating or postheating. Weldments can be readily cold worked after stress relieving or annealing.

The new metal is essentially a 12-chromium 1½-nickel composition having relatively high tensile strength and good ductility. It is said to show marked improvement in weldability over Type 410 stainless and a more uniform structure and higher hardness than Type 405.

Circle No. 194 on Reader Service Card.

Inert Gas Welding Torch

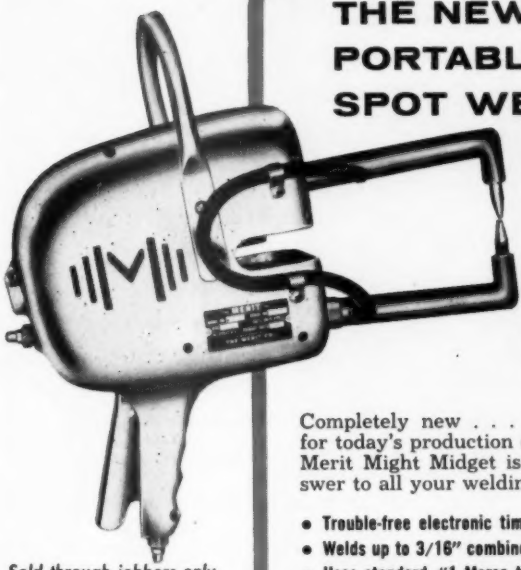
A new compact and lightweight inert gas shielded arc welding torch has been developed by the Wilson Equipment Corporation. This torch is air cooled, weighs 2¾ ozs. and handles currents from 5 to 150 amps. The overall head length of the angle torch (also available in straight model) is 1¾" with gas cup installed.

Durability is achieved by the use of laminated glass cloth and silicone resin to insulate the head. This material will neither char nor soften.

The torch is available in three electrode sizes and eight gas cup styles making it extremely useful on many applications, especially those involving confined places.

Circle No. 195 on Reader Service Card.

For More Information Circle No. 12 on Reader Service Card.



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THE MERIT COMPANY
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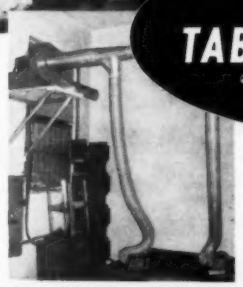
CAR-MON DUAL TAB-L-EXHAUSTER

assures "on-the-spot" efficiency with powerful suction in magnet-base receptor



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Write for full details and catalog.

CAR-MON PRODUCTS, INC.
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For More Information Circle No. 52 on Reader Service Card.

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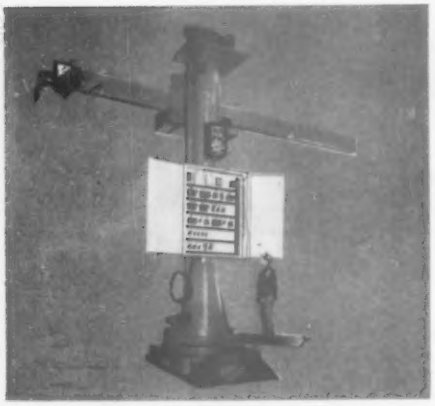
(see translation below)



- Precision
- Ruggedness
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- Double Chain Lift
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- Complete Automation

Welding Head Manipulator, CB 18 x 22 (above) provides motorized vertical adjustment of 18′ (3′ to 21′), 22′ variable speed ram travel and motorized 360° rotation. Heavy duty carriage carries Manipulator, Generators and Flux Recovery Equipment. All Manipulator and Welding Controls in light weight pendant. Operator sits at working end of ram.

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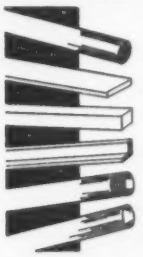

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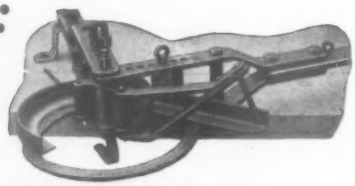

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- Adaptable, replaces special equipment.
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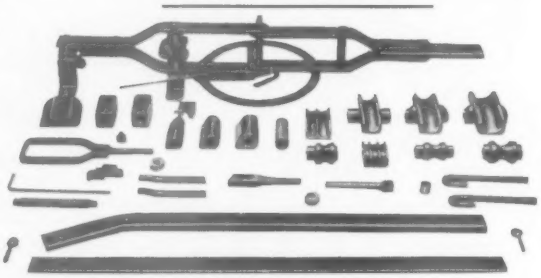

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HOSSFELD MFG. CO.

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For More Information Circle No. 50 on Reader Service Card.

Pistol-Grip Electrode Holder

A pistol-grip electrode holder introduced by Frank Niemi Metals Products, Inc., is said to give increased work area vision and speed welding output while cutting electrode costs. The manufacturer states the holder allows the operator to see work right down to the end of the weld, increasing production two ways: through longer welding time between electrode changes and by utilizing all of the electrode without worrying about burning insulated tips or handle.

Features listed for the new holder include safety trigger control, parallel gripping jaws for firmer electrode gripping, push-button stub ejection and a non-shorting plastic case in vivid, easy-to-identify colors. Internal parts are insulated inside the pistol-grip handle.

Circle No. 77 on Reader Service Card.

Knock-Down Type Of Gantry A-Frame

A new line of patented "knock-down" type Budgit gantry A-frames in one- and two-ton capacities has been announced by Shaw-Box Crane & Hoist Division of Manning, Maxwell and Moore, Inc. Each comes in a shipping carton, is compact, and easy to carry, assemble and store. No special tools are required: two men can easily assemble and erect either model in less than two hours. When equipped with a hoisting unit, these A-frames make sturdy, mobile lifting devices.

An American Standard Section I-beam can be purchased with the unit as a separate item or can be purchased locally.

Circle No. 196 on Reader Service Card.

Unique Aluminum Pipe

Unistrength Pipe is a unique, low-cost tubular product of the Aluminum Company of America.

A seamless, one-piece pipe combining thin walls with standard wall thickness at pipe ends, Unistrength is adaptable to all joining methods. But, its advantages are well demonstrated by welded joints. By decreasing wall thickness of weldable, heat treated alloys, except at the joints where the heat of welding lowers strength, a 40-percent weight savings is

achieved. The ratio of thick-to-thin walls is selected to provide uniform bursting, tension and bending strength along the pipe's length after welding.

The pipe is available in 40-foot lengths in 6063-T6 and 6061-T6 alloys with schedule 40 wall thickness at the ends. This permits the use of standard aluminum fittings and flanges.

Circle No. 197 on Reader Service Card.

Two-Tone Frame Safety Spectacle

A new two-tone frame safety spectacle which combines style and comfort with protection has been introduced by the Glendale Optical Company for use by plant management personnel, visitors and others not requiring heavier eye protections.

The new Glentone safety spectacle has a two-tone frame of sheet stock cellulose acetate butyrate and features a universal bridge which will fit more than 90 percent of all users. Interchangeable S7 lenses of superhardened glass are pierce and impact resistant giving maximum protection. Seven-barrel hinges eliminate temple rocking. Adjustable wire core spatula temples, ranging from 5½- to 7-inches, provide added comfort for men and women.

The Glentone is available in eye sizes 44, 46 and 48 in the 7200 series, clear lens, or the F7200 series, with light, medium or dark green lenses for ultraviolet and infra-red protection.

Circle No. 198 on Reader Service Card.

Work-Holding Clamps

The Detroit Stamping Co. has introduced a line of easy-to-use clamps called Flex-o-matics. Features: small size; lightweight; compactness, low cost; jaws easily cut, shaped, tapped or altered; may be easily fabricated from stainless steel, aluminum or other materials, and all standard models are equipped with red plastic handle grips. Come in 6 models with various weights and holding pressures.

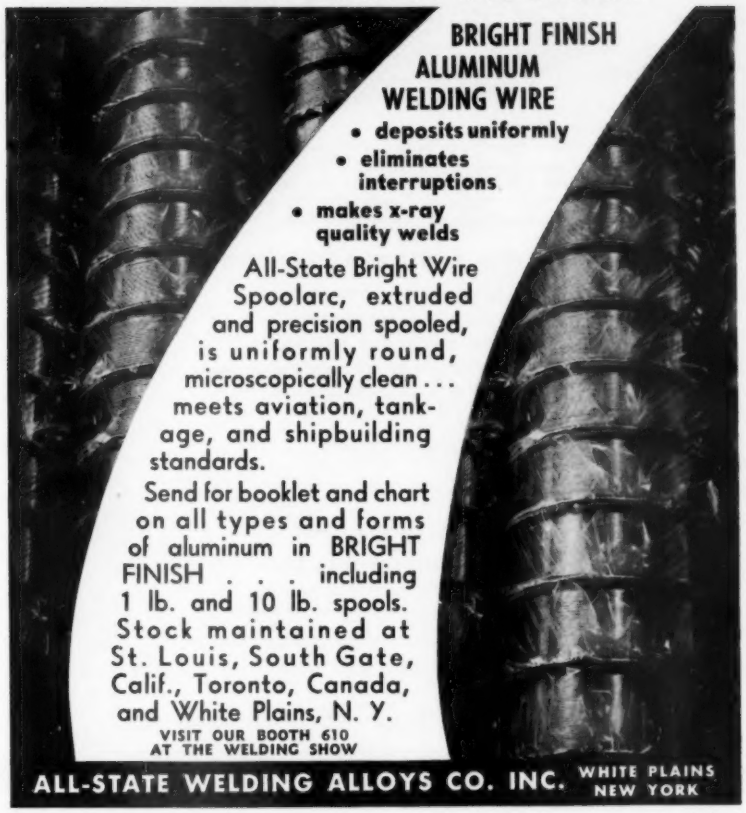
Circle No. 199 on Reader Service Card.

Bronze Brazing Alloy

Dalweld Company, Inc. announces a new low-fuming bronze brazing alloy. The alloy is recommended for general purpose and all-around welding work. Available in both bare and flux coated form, it meets all ASTM, AWS and federal specifications.

Circle No. 200 on Reader Service Card.

For More Information Circle No. 4 on Reader Service Card.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For More Information Circle No. 85 on Reader Service Card.

For More Information Circle No. 38 on Reader Service Card.

Flood FIBER GLASS WELDING HELMETS
For Safety, Comfort and Economy

These seamless fiber glass units (of thermo-setting, polyester resin) are compression-molded and stoutly reinforced to afford maximum protection. All are fitted with a new ratchet type head gear which adjusts to size with the flick of the fingers. Headgear material (of high impact plastic) is smooth, easy to clean and unaffected by chemical reaction.

NEW DESIGN ADVANTAGES

1. Lighter weight for more comfort.
2. A smoother and stronger shell.
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4. Non-warping moisture-proof construction.
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3800 Springdale Ave., Glenview, Ill. • 274 Commerce Street, Newark, N.J.

For More Information Circle No. 26 on Reader Service Card.

New Arc Welders

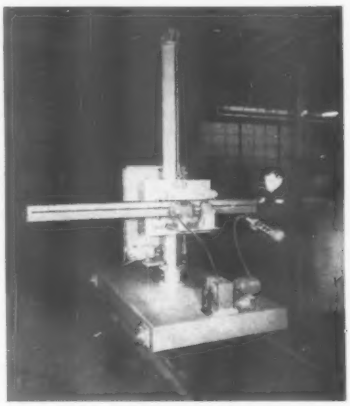
A new line of industrial arc welding machines has been announced by Lincoln Electric Company. The new manual arc welding machines are said to have improved arc characteristics and many new optional features.

The welders, called the "TM" Idealarc, are available in NEMA rated 300, 400, 500, and 600 ampere sizes either as AC transformer welders or combination AC and DC rectifier welders.

User, dependent on application, may chose remote control of current and polarity, or a low voltage contactor that reduces open circuit voltage when the machine is on and not welding. Other optional features are available.

New construction features provide added conveniences, protection and reduced maintenance.

Circle No. 220 on Reader Service Card.



Low Cost Manipulator

The C. B. Herrick Corporation of Cleveland, Ohio has developed and is now building a new model medium duty, low cost welding head manipulator. This unit has many of the features of heavy duty machines. The CB 6x8 MD manipulator illustrated provides 96 inches of ram travel using electronic control with a variable speed range of 5 to 100 inches per minute. The vertical adjustment is a full 72 inches, motorized, with magnetic braking. The column and ram rotate 360° within the base and may be locked at any degree.

This model may be stationary or mounted on a motorized variable speed travel carriage as shown. The carriage will accommodate power supply units and flux recovery equipment. Complete push button control of all movements and speed is in a small light-weight portable pendant. Welding controls (arc start and stop, wire inch up and down) plus speed indicators for reading inches per minute are available with this model.

Circle No. 221 on Reader Service Card.

Extension Shielding Nozzles; Contact Tubes

Something new has been added to the consumable electrode welding process by Metal Parts, Inc. This company is offering an assortment of extension nozzles that fit the Westinghouse SA-110 and SA-1 series of Mig welding equipment. The extension nozzles are said to extend the range of the gun at least 100 percent, reducing operator fatigue and making it possible to do jobs hither-to impossible because of the limitations on the depth that the gun would reach and the inability to use the gun in a confined space.

Nozzle extensions are available in 1- to 6-inch long straight extensions and curved extensions to 45°.

Contact tubes give water-cooled protection to the nozzles for those jobs where a preheat is necessary (above, extreme right).

Circle No. 113 on Reader Service Card.

Pneumatic Grinders

A new line of portable pneumatic grinders has been introduced by Thomas C. Wilson, Inc.

These new horizontal grinders have been designed for ease of handling and reduced operator fatigue in any metal removing or finishing operation. Various sizes and models are available, with speeds ranging from 3100 to 12,000 rpm. Wheel sizes range from 3 to 8-inches in diameter. Lever, straight and grip-type handles are available.

A companion line of high-speed powerful grinders is also available.

Circle No. 222 on Reader Service Card.

Paralleling Attachment

A new attachment which simplifies the paralleling of two arc welders to use their combined capacity for such work as automatic welding, arc cutting and stud welding. It also provides protection to the welders in the event of either machine being set or adjusted improperly, or failing to perform properly.

Components are enclosed in a steel case 13-inches long, 16-inches wide and 15-inches high and functions in use with any Hobart electric, gasoline, or diesel-powered rotating-type DC welder that is rated on the basis of 60 percent duty cycle or higher. Approximate weight is 145 lbs.

Circle No. 223 on Reader Service Card.

NEW!

STAINLESS STEEL WELDING SCALE & OXIDE REMOVER

Ox-Off 536, an exciting new chemical formulation, removes most types of welding scale and oxidation from stainless steels in only seconds. Eliminates costly, time-consuming hand grinding, sanding, and compounding methods. Large pieces rapidly and effectively treated by only one or two strokes of hand applicator—small pieces by immersion in a quick-acting bath. **Just one try and you'll buy.**

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Resistance Welding Control Components of Molded Plastic

Resistance welding control bus distribution plates are now being made to recognized dimensional and performance standards by Synthetics Development Company.

They eliminate the need to custom-fabricate plates from plastic sheet stock, and speed assembly or modification of control panels. Blocks are molded of polyester plastic reinforced with glass fiber. High impact and dielectric strength, and good corrosion resistance are claimed. Plates are 1¼-inches thick, 6½-inches wide (to carry 4½-inch bars, for 400-and 800-amp service) and are made in three lengths, to hold one, two, or four bus bars. There are four mounting holes (for ⅜" dia. hex head cap screws) in each plate.

Circle No. 204 on Reader Service Card.

Aluminum Solder Comes In Four Forms

The United Welding Service Company has announced the availability of 720 solder in continuous wire, cast rod, $\frac{1}{16}$" by $\frac{3}{16}$" strip, and powder.

No flux is required with 720 for mitered corners, simple lap and butt joints, for filling imperfections and repairing aluminum and zinc castings. Joints made by stroking rod or strip across heated aluminum are said to be permanent, non-corrosive, and strong. 720 melts at 720°F and will take appreciable heat in end use.

A companion product is the new 720 Flux. Featured is excellent capillary action necessary for high speed production or furnace soldering.

Circle No. 202 on Reader Service Card.

Long Life Precision Limit Switches

A new line of limit switches designed for industrial applications where millions of operations are required has been announced by Cutler-Hammer Inc.

The talking point of these small heavy duty switches the unique contact mechanism which adds long electrical and mechanical life and superior operation. The movable contact assembly makes and breaks fast because of compressed coil springs; a contact-carrying leaf spring keeps pressure on full-time to eliminate zero pressure; and carrier spring insures good electrical contact on low voltage with the right amount of contact wipe.

Switches are enclosed in a strong, semi-dust tight, high arc resisting capacity molded phenolic case and are rated at 600 volts. Plunger, roller and cabinet door operators are available for use in combination with the basic switch.

Circle No. 203 on Reader Service Card.

Extruded Rectangular Wear Strips

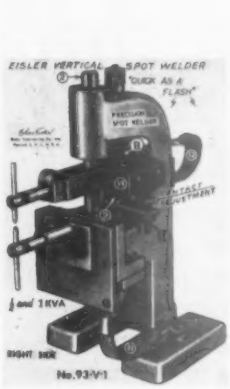
. . . are a new addition of Ampco Metal, Inc., to their line of wear materials, supplementing cast and rolled forms.

The copper-base Ampco rectangles come in 46 sizes, as-extruded in mill lengths to close width and thickness tolerances. Grade 18 rectangles are made to within a narrow composition range, and are alloyed to provide a uniform fine grain structure for maximum resistance to wear and ease of machining.

Mechanical properties of the dense, high quality metal reach 108,000 psi tensile, 55,000 psi yield, and 230 Brinell hardness and will combat metal-to-metal wear, abrasion, corrosion and fatigue in machine components. Typical uses: Slides, wear plates, gibs, and ways.

Circle No. 201 on Reader Service Card.

EISLER *makes the largest selection of spot, wire butt and foil welders . . .*



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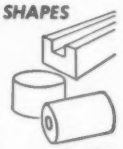

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Send for Bulletin 59-3

BECKER BROTHERS CARBON CO.
3450 South 52nd Ave Cicero 50 (Illinois)

Circle No. 19 on Reader Service Card.

700 KVA RESISTANCE WELDER

Continued from page 37

and stands 40′ long, 22′ wide and 11′ high.

"Adjustments on the entire machine are so delicate that absolute uniformity of molecular content in the steel is an essential," Mr. Bustin said. "This is particularly vital in the pre-forming stage where metal fatigue must be avoided and, in the welding operation, where the least appreciable variation in uniformity might cause costly down-time or necessitate control resetting. Our engineers and our supplier, Sharon Steel, have developed specifications which have proved most satisfactory in meeting those requirements."

The grating is said by Mr. Bustin to be the first all-directional, loading-bearing, non-slip grating to be produced automatically. Unlike most gratings, no side bars are required.

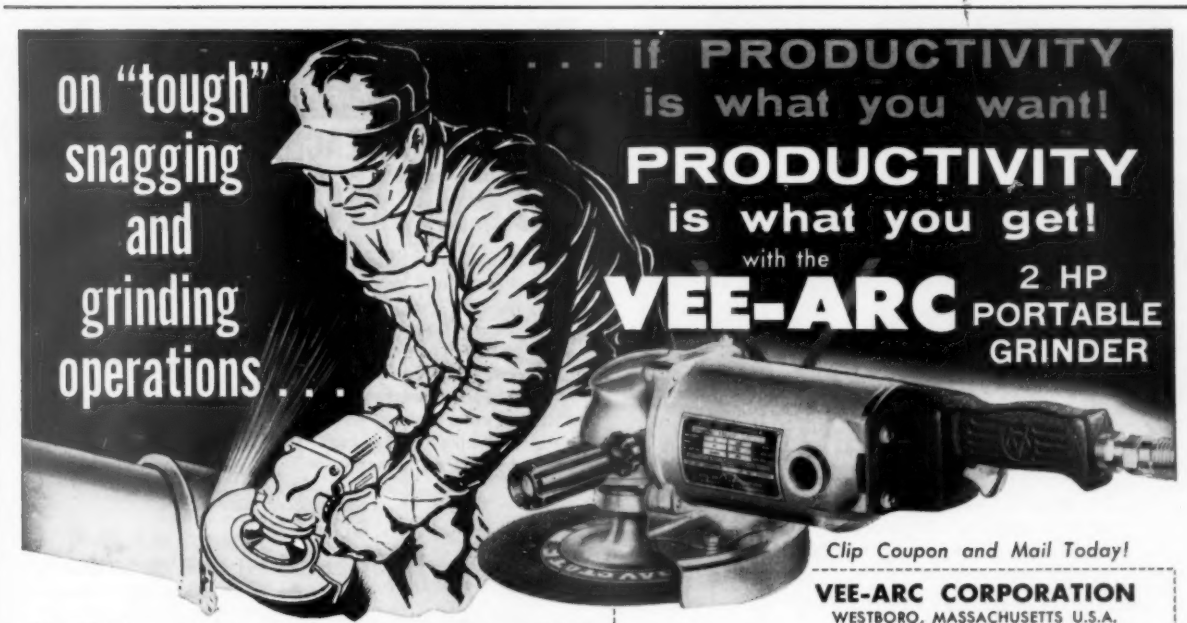
Here's how it's done: Steel bars up to 10′6″ in length and from ½″ x ⅛″ to 1″ x ⅛″ in width and depth are first passed through rotary grit blaster to remove scale and rust and then run through a Bustin-engineered machine which notches one edge at a high rate of speed. These bars then fed into a 40° angle gravity feed at the head of the automatic machine.

The bars are then fed into a "peeler" which pushes them one by one onto receptacles on conveyor chains. They are then carried to a predetermined position where they are picked up in pairs by a double series of mechanical fingers running the width of the machine. These fingers convey two bars at a time to an "accumulator" where they are pre-formed in opposite directions by lateral dies pushing progressively from left to right the length of the bars without metal fatigue. Other mechanical fingers then lift the pre-formed bars and convey them to final forming dies while the first fingers return for more steel.

In final forming dies, the bars receive a zig-zagged effect, which gives the grating its non-skid property. These dies are changeable, with the result that many forms of grating can be produced.

In line welding: From final forming other mechanical fingers lift the bars and convey them to an indexing table for the welding operation, at the end of the fabricating line is a 14-ton multi-spindle, full-depth resistance welder, operating on 700 KVA. It possesses its own transformers located just outside the main plant building. This welder is synchronized for alternate feeding. The firing sequence is adjustable, and the number of guns fired at one time is variable, depending on job requirements. All welders can be fired together or in series of threes and fours, or alternately, as desired.

In operation this welder works on the contact points of the formed metal fed to it, welding the full height of the bar. As quickly as one bar is welded to its neighbor, another bar is fed to the


on "tough" snagging and grinding operations . . .
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For More Information Circle No. 104 on Reader Service Card.

welder with the result that process is continuous. Theoretically, grating could be produced endlessly; a timer cuts the welding guns when the grating reaches the required width, usually 48 to 72 inches. However, the machine can make grating of any width. You can get some idea of the machine's speed from the fact that it takes but seven seconds for a bar to flow from the feeder through the welder.

Painting: From the machine the grating passes to a paint dip and into an oven where it is baked at 350° for 3 minutes. It is then carried on conveyor belt to shipping department.

SEMIAUTOMATIC SURFACING

Continued from page 51

the company is using a semiautomatic open arc process.

Old manual method: They used 5/32" and 3/16" diameter electrodes. In the as-welded condition the electrodes produced a semiaustenitic deposit to resist abrasion and impact.

According to Burtscher, the deposit served well in the field but applying it was slow. Painstaking preheating and controlling interbead temperatures was required.

New semiautomatic method: The Miller Company finds this new semiautomatic hardfacing process very practical. It is much faster, needs less care in overlaying the bead. According to Burtscher it cuts labor in half.

Procedure: They first deposit 7/64" diameter high nickel manganese electrode. As-welded, the deposit is 11 to 14% manganese and 2½ to 3½% nickel. The electrode, fed from a coil through a cable, deposits 8 to 10 pounds an hour. It is expressly used to build up the part to its original shape and size. There is no limit to build up. They use 325 to 350 amperes and 30 to 35 volts, electrode reverse polarity. They can deposit metal about 3 times faster than in manual hardfacing.

For final overlay and proper build up Burtscher uses a high carbon-high chrome electrode that is extremely good for abrasion. It deposits 12 to 15 pounds an hour. • •

ULTRASONIC TESTING

Continued from page 45

No further testing is done until the plates are moved into the shop. At this point suspicious plates are separated for top checking. Much of the edge checked plate is found to be satisfactory as the result of the top check; they are within acceptable specified limits.

Edge checking is the secret of making this an economical process; it only takes a few seconds a plate. Top checking of all material would be too costly.

Since the start of the ultrasonic testing program expensive rejections of semi-finished assemblies due to laminations have been eliminated. • •

Something New Has Been Added . . .

EXTENSION SHIELDING Nozzles and Contact Tubes

for Westinghouse SA-110 and SA-1 series of MIG welding equipment
1- to 6-inch long straight extensions and curved extrusions to 45°

- Gives gun tight corner reach
- Reduces operator fatigue
- Contact tube water-cools; protects operator, nozzle and gun

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For More Information Circle No. 75 on Reader Service Card.

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Evans tapes supplied with your company name and advertising on each tape for presentation to your customers. A wonderful way to build good will. Available in individual gift package.

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For More Information Circle No. 36 on Reader Service Card.

BUSINESS is good so . . .

Sellstrom Expands Prescription Glass Lab

PALATINE, ILLINOIS: Sellstrom Manufacturing Co. has expanded its prescription laboratory facilities to meet the increasing demand for industrial prescription safety glasses. The new service will be devoted to making and grinding tempered impact-resistant safety glasses to individual prescription.

IAA Awards Reinhard Special Morehead Medal

NEW YORK, N.Y.: A special posthumous award of the James Turner Morehead Medal was made to Herbert F. Reinhard by the International Acetylene Association. Award of the medal to Mrs. Reinhard took place at a special luncheon here late in February.

This special Morehead Medal was created by the IAA Board of Directors and John Motley Morehead to recognize Reinhard's long and devoted service to the Association and to the oxy-acetylene industry.

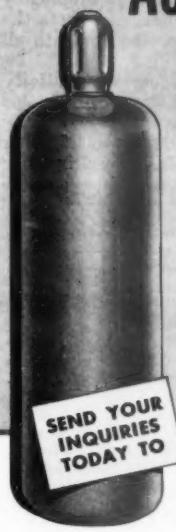
Reinhard was secretary of the IAA for 27 years at the time of his death last year.

K-G Equipment Establishes Steele Gases

K-G Equipment Co., Inc., has established Steel Gases, Inc., Forest Park, Illinois, as the company's Midwest sales office and warehouse. The operation will service K-G distributors in Chicago, Illinois, Iowa, Wisconsin, Minnesota, eastern Missouri, northern Indiana and southeast Michigan.

For More Information Circle No. 53 on Reader Service Card.

LOOKING FOR THE BEST? Buy
INDEPENDENT
Acetylene Cylinders



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No Grinding Necessary After Cut. One Stroke Cycle Clutch Operated by Hand or Foot.

The Bateman "Bantam" cuts 2" x 2" x ¼" angles and ¼" x 4" flats. Standard punches will fit this machine. The Coper will cope 1¼" through ⅛" material. It will punch ½" hole through ¼" material. With the clutch open, the Bantam will make 44 strokes per minute. It is made of high-grade cast iron, with the clutch, pin and dog made of hardened steel. The blades are made with tool steel. It is powered with a fly wheel and gear drive, and uses a small ¾ hp motor, 1750 rpm.

Bateman Bantam with punch ... $575.00
Shear only ... $495.00
Shipping wt. 750 lbs.

BATEMAN FOUNDRY & MACHINE
MINERAL WELLS, TEXAS

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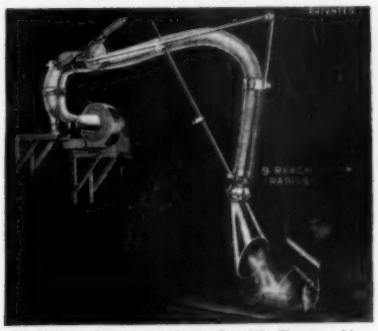
Remove Welding Fumes at the Source... with RUEMELIN FUME COLLECTOR



Welding shops equipped with Ruemelin Fume Collectors are assured of a clean shop atmosphere. Noxious fumes, heat and smoke are eliminated AT THEIR SOURCE. Improves working conditions . . . lessens fatigue . . . paves the way for increased plant production. Especially helpful in winter months when windows and doors are closed.

Note the new spring-loaded counterbalance mechanism which makes Fume Collectors much easier to handle.

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Mfrs. & Engineers • Sand Blast & Dust Collecting Equipment

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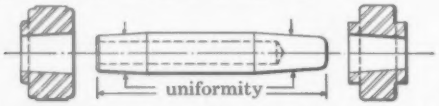
For More Information Circle No. 100 on Reader Service Card.

TUFFALOY

They Look different... and they Are!

The bright and shiny look of the new Tuffaloy spotwelding tips is due to a process that practically eliminates oxidation. More than that, it reflects the deep-down quality built into these tips and into all Tuffaloy products.

What you want in these tips is highest conductivity and resistance to deformation. Tuffaloy provides this by the most modern manufacturing methods, and by constant scientific quality control all the way: alloying of pure copper, semi-continuous billet casting, bar extrusion and salt bath heat treating.



And in converting this high-quality bar stock to welding tips, Tuffaloy insures conformity to all standard dimensions. Before shipment all tips must pass inspection by gage for uniformity in length, Morse taper, and the outline of the point.

Tuffaloy resistance welding alloy products are widely available through Airco and Tuffaloy representatives. Call on them for SPOTWELDING TIPS (Standard, 'Tuffcap', Cold-Bent, and Special), Holders and Adapters, BAR STOCK, FORGINGS, SEAM WELDING WHEELS, and all other welding alloy needs. Ask for Catalog and Price List.

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What will they think of next?

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Preview some startling new ideas on display in Booth No. 122— Chicago International Amphitheatre, April 7-9.

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Milwaukee 1, Wisconsin

For More Information Circle No. 90 on Reader Service Card.

Canadian Welding Society Sponsors Show

TORONTO, ONTARIO: The Canadian Welding Show sponsored by the Canadian Welding Society will be a section of the National Industrial Production Show of Canada to be held May 4-8 at the Industry Building in Exhibition Park.

The C.W.S. is organizing a general convention for the welding industry in the adjoining Coliseum Building. Dates of the convention are May 5-6.

Some 16 speakers from Canada, Great Britain and the United States will discuss a variety of welding, cutting and brazing problems.

Linde Builds Alabama Liquid Oxygen Plant

HUNTSVILLE, ALABAMA: A large liquid oxygen- and nitrogen-producing plant will be built soon in the vicinity of Redstone Arsenal, near here, by Linde Company, Division of Union Carbide Corp. The new plant, which will be capable of producing 100,000,000 cubic feet of oxygen and nitrogen per month, will be completed early next year.

TOOLS OF THEIR FATHER'S TRADE occupied these Mexican brothers during their on-the-job training at Smith Welding Equipment Corp., Minneapolis. Shown (left to right) are Augustine, Elmer and Valdimar Franco, Emil Ortenstone, industrial engineer, and J. E. (Jack) Smith, executive vice president of the firm. The Francos are heirs apparent to their father's portion of Compania Mexicana de Soldadura Autogena, S.A. of Mexico City, the largest welding equipment distributor in Mexico.

Airco Produces At New Kansas City Plant

KANSAS CITY, KANSAS: The completion of a new facility for the production of oxygen and nitrogen in this city's Armourdale district has been announced by Air Reduction Sales Co., a division of Air Reduction Co., Inc. The new plant makes high purity oxygen and nitrogen and is designed to expand capacity to serve users of industrial gases located within a 300 mile radius of Kansas City.

Electric Arc Appoints Foreign Sales Rep

NEWARK, NEW JERSEY: Appointment of John D. Williams Export Corp., New York City, as foreign sales representative for Smith-Dolan induction heating equipment has been announced by Electric Arc, Inc. The Williams Export organization will cover all foreign countries except Italy.

Los Angeles Section Meets With A.S.M.

LOS ANGELES, CALIFORNIA: Los Angeles Section of the American Welding Society will act as host to the A.S.M. at a joint meeting in the Rodger Young Auditorium on April 16, according to R. C. Hayes, vice chairman. Richard K. Lee, technical director and vice president of Alloy Rods Co., will address the meeting.

Liquid Carbonic Acquires Industrial Air of South

CHICAGO, ILLINOIS: Acquisition of Industrial Air Products of the South has been announced by Liquid Carbonic Division of General Dynamics Corp. Acquired were two plants, with a total of 60 employees, manufacturing oxygen and acetylene in New Orleans, La., and Pescayoula, Mississippi. Warehouses are located in New Orleans, Baton Rouge, Houma and Morgan City, Louisiana.

Air Products of the South will be under the management of Liquid Carbonic's Southern Region with headquarters at Atlanta, Ga.

For More Information Circle No. 112 on Reader Service Card.

Eliminates Spatter Grinding After Welding

YORK'S *SPAT-R-PRUF* COMPOUND 106

THREE *EASY* STEPS

1. Coat Surface
2. Weld
3. Wipe Off

A perfect paint base. No stirring or dilution necessary. No grinding after welding—spatter can be wiped away with a dry cloth.

IMPORTANT FEATURES

- Non Toxic
- Non Inflammable
- Pleasing Odor
- Harmless to Skin
- Helps Prevent Rust
- No Weld Porosity

Available in 1 gallon cans and 5 gallon cans and 55 gallon drums.

3-IN-1 YORK'S '77' SPECIAL FLUX

- For General Brazing
- For Cast Iron Welding
- For Cast Iron Brazing

A guaranteed bond even under toughest conditions.
Available: 1 lb. Cans

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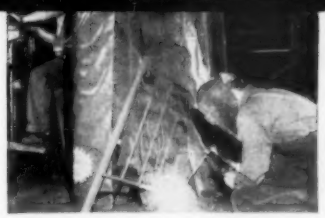
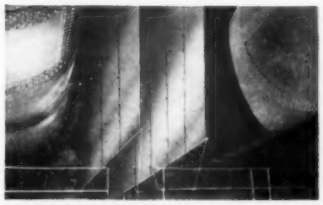
These famous Frommelt products now available with "RAY-FOIL . . . a new glass base foil cloth designed for greater heat protection . . . longer life . . . lower maintenance !

PORTO-SCREEN kits in 2 or more sections. Self-standing, portable, lightweight. Perfect for welding screens, partitions, safety shields, windbreaks, etc. Other Fabrics available.



SPA-FLA flexible screens that "form around the job." Lightweight, easily portable, long lasting. Roll up compactly for storage. UL approved. Other Fabrics available.



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Circle No. 2 on Reader Service Card.

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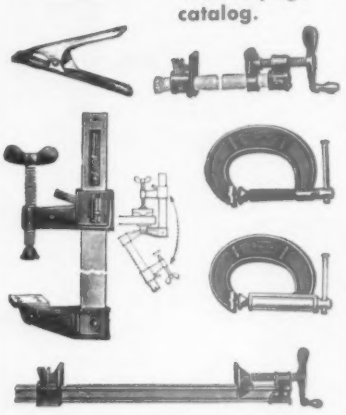

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Circle No. 58 on Reader Service Card.

INDUSTRY NEWS *continued*

N.W.S.A. Announces Convention Details

The 15th Annual Convention of the National Welding Supply Association will be held at the Fairmont Hotel, San Francisco, Monday, Tuesday and Wednesday, May 4, 5 and 6. Complete details will be announced in full in the May issue of INDUSTRY & WELDING.

Liquid Carbonic Holds Compressed Gases Seminar

CHICAGO, ILLINOIS: A comprehensive engineering seminar on compressed gases was held recently for all field engineers of General Dynamics' Liquid Carbonic Division at the company's plant here. Under the direction of Edward J. Vogel, technical sales director, the two week course included the study of new applications of liquefied gases, physical properties of gases and technical servicing of welding equipment.

Wall Colmonoy Names Milwaukee Brazing Jobber

Appointment of Industrial Products Engineering Co., Milwaukee, Wis., to represent the Stainless Processing and Wallco Manufacturing Division of Wall Colmonoy Corporation has been announced. The firm will represent Wall Colmonoy in Wisconsin, Minnesota and Upper Michigan. Both divisions do contract brazing work for industry.

NCG Opens New Cleveland Office

CLEVELAND, OHIO: The National Cylinder Gas Division of Chemetron Corporation has established new offices for its north central region at 2191 South Green Rd. The regional headquarters were formerly located in the Terminal Tower Building. Chemetron's NCG Division also maintains district sales offices and gas-producing facilities in suburban Euclid, Ohio.

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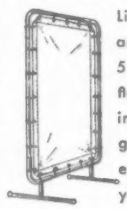

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A. O. Smith Changes Electrode Pricing Format

MILWAUKEE, WISCONSIN: A. O. Smith Corporation's Welding Products Division announced on March 9th the first major change in the pricing format of welding electrodes to be made in many years in the arc welding industry.

G. E. Kemper, manager of A. O. Smith's Welding Products Division, said the new format will enable distributors to obtain maximum pricing benefits in 20,000 lb. lots, instead of 40,000 lots, as has been the industry's past practice, and to enjoy a substantially greater percentage of profit margin in the ranges where they sell 95 percent of their electrode products.

"We feel that this new pricing format is positive and constructive," Kemper said, "and that it will result in better and more realistic distribution in the welding industry. Furthermore, we think it is a significant step to reduce prices in the fight against inflation."

The new pricing format will enable large users of electrodes to purchase 40,000 lb. quantities at a price 12 percent less than they previously paid.

Research Program on Nuclear Boilers

SAN ANTONIO, TEXAS: A basic research program aimed at improving the design and efficiency of nuclear boilers and other pressure vessels is underway at Southwest Research Institute. The work is jointly sponsored by the Atomic Energy Commission and the Pressure Vessel Research Committee of the Welding Research Council.

Pressure vessels are weakest at their openings and it has been customary to overdesign them to provide a generous safety factor since there is not enough basic information available to set minimum safety design requirements.

Aimed at producing that knowledge, this program of experimental stress analysis will utilize specially designed vessels made of three different steels: ASTM A-201; ASTM A-302 and U.S. Carriloy T-1.

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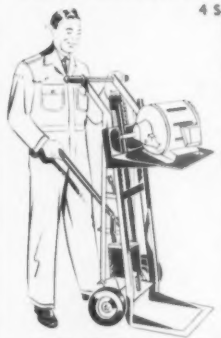

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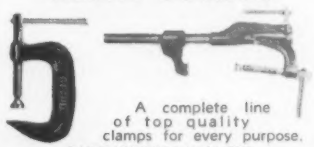

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LINDE COMPANY PRESIDENT, William M. Haile, presents certificate to the 200th graduate of Linde's distributor training school at Speedway, Indiana, and says . . .

Oxygen Production Will Rise In 1959

INDIANAPOLIS, INDIANA: William M. Haile, president of Linde Company, Division of Union Carbide Corp., said that oxygen production in the United States is expected to exceed 80 billion cubic feet in 1959. Haile said this projection indicated a rise of about 20 billion cubic feet over last year's output.

Haile expressed the opinion that welding supply distributors will handle a considerable amount of increased oxygen business as well as greater sales of other products. He said, "We believe the most significant phase in welding supply distribution is at hand. We have made a liquid oxygen program available to distributors. We believe this will open a new era in the distribution of industrial gases and other welding needs."

"This new concept in distribution provides the distributor and ultimate user with economies in handling, transporting and storing oxygen."

Hobart Movie Is On Electrode Coatings

TROY, OHIO: An 18-minute color, sound 16-mm movie is available without charge from Hobart Brothers Co. It features the many fascinating steps involved in mining minerals for electrode coatings from the sea sands of Florida.

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The Armour Research Foundation has openings for experienced welding engineers. Applicants should have several years of experience in welding and brazing research with at least a B.S. degree in Welding or Metallurgy.

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Harnischfeger Corp., Milwaukee, Wisconsin: Johnson Welding Supply Co., 10 Franklin Ave., Hartford, Conn.

Tipaloy, Inc., Detroit, Michigan: Ohio Valley Sales Co., Inc., 709 Melish Ave., Cincinnati 29, Ohio.

World Electric Co., Cleveland, Ohio: General Welding & Industrial Supplies, Ltd., Toronto, Ontario, Canada.

Nu-Matics Grinders, Inc., Cleveland, Ohio: Wm. N. Lowe Company, 19055 West Davison, Detroit, Michigan.

A. O. Smith Moves Southeast Welding Rep

ATLANTA, GEORGIA: A. O. Smith Corp. has moved its Southeastern welding sales representative, J. P. Thomas, to its new Southeast branch Product Service Building at 754 Miami Circle, NE. Mr. Thomas was formerly located in Decatur, Georgia.

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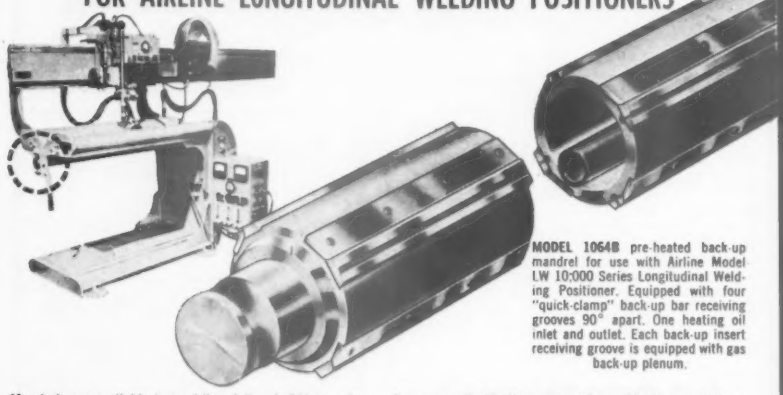

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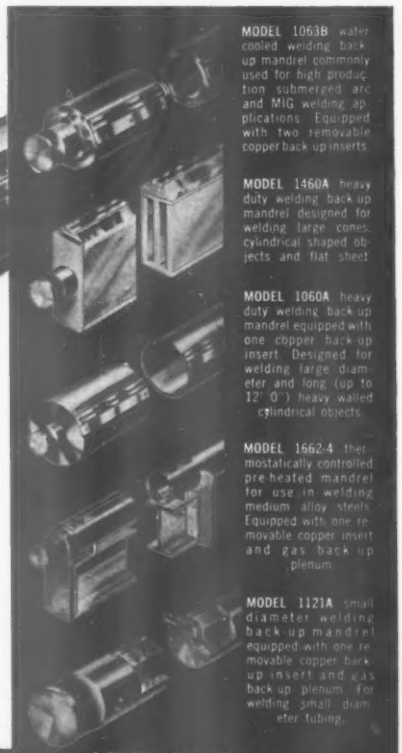

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Details concerning the type of rod and procedures recommended for surfacing various metals are available in Publication B-13, "Anaconda Welding Rods."

Free technical assistance. In most cases, Anaconda distributors can help you select the exact rod you need for your job. But if you have special problems, Anaconda welding engineers are at your service. For a copy of Publication B-13 with comprehensive information on Anaconda Welding Rods and procedures — or for technical assistance — write: The American Brass Company, Waterbury 20, Conn. In Canada: Anaconda American Brass Ltd., New Toronto, Ont. 5917

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